YALE MEDICAL LIBRARY
3 9002 07959 4694

YALE UNIVERSITY
LIBRARY

LIBRARY OF
THE SCHOOL OF
MEDICINE
Section on Odontology
Carnegie Foundation Fund

Digitized by the Internet Archive
in 2014

https://archive.org/details/dentalcosmos3818whit

THE

DENTAL COSMOS:

A

MONTHLY RECORD OF DENTAL SCIENCE.

Devoted to the Interests of the Profession.

EDITED BY

EDWARD C. KIRK, D.D.S.

Observe, Compare, Reflect, Record.

VOL. XXXVIII.

PHILADELPHIA:
THE S. S. WHITE DENTAL MANUFACTURING CO.,
CHESTNUT STREET, CORNER OF TWELFTH.
1896.

LIST OF CONTRIBUTORS

TO VOLUME XXXVIII.

Allan, C. F.	Newburgh, N. Y.
Allan, G. S.	New York, N. Y.
Allen, C. A.	Buffalo, N. Y.
Allen, H. J.	Washington, D. C.
Allwine, H. W.	Omaha, Neb.
Amoedo, O.	Paris, France.
Barker, A. D.	Grinnell, Ia.
Barrett, W. C.	Buffalo, N. Y.
Black, G. V.	Jacksonville, Ill.
Byers, W. G. M.	Montreal, Can.
Cryer, M. H.	Philadelphia, Pa.
Duncan, T.	Fort Wayne, Ind.
Elliott, A. V.	Florence, Italy.
Farrar, J. N.	New York, N. Y.
Fillebrown, T.	Boston, Mass.
Firthe, C. A.	Queanbeyan, N. S W
Flagg, J. F.	Philadelphia, Pa.
Flanagan, A. J.	Springfield, Mass.
Flickinger, A.	St. Louis, Mo.
Frink, C. H.	Lake City, Fla.
Gerhart, H.	Lewisburg, Pa.
Gillett, H. W.	Newport, R. I.
Gray, J. P.	Nashville, Tenn.
Head, J.	Philadelphia, Pa.
Heckler, J. W.	Buffalo, N. Y.
Hinman, T. P.	Atlanta, Ga.
Hollingsworth, M. W	Philadelphia, Pa.
How, W. S.	Philadelphia, Pa.
Hugenschmidt, A. C	Paris, France.
Ibbotson, J. S.	Montreal, Can.
Jack, L.	Philadelphia, Pa.
Lamb, J. M.	Washington, D. C.
Lett, I.	Philadelphia, Pa.
McCurdy, S. L.	Pittsburg, Pa.
Mason, W. L.	Red Bank, N. J.
Maxfield, G. A.	Holyoke, Mass.
Mills, W. A.	Baltimore, Md.
Morton, W. J.	New York, N. Y.
Newton, R. C.	Montclair, N. J.
Ottofy, L.	Chicago, Ill.
Perry, S. G.	New York, N. Y.
Rhein, M. L.	New York, N. Y.
Runschenbach, R.	Dresden, Germany.
Smith, F. M.	New York, N. Y.
Spencer, H. C.	Chelsea, Mass.
Stowell, S. S.	Pittsfield, Mass.
Talbot, E. S.	Chicago, Ill.
Thompson, A. H.	Topeka, Kansas.
Trueman, W. H.	Philadelphia, Pa.
Walker, W. E.	Pass Christian, Miss.
Walton, J. C.	Howell, Mich.
Wassall, J. W.	Chicago, Ill.
Williams, J. L.	London, Eng.
Winkler, G. H.	New York, N. Y.
Witthaus, C.	Rotterdam, Holland.

CONTENTS OF VOLUME XXXVIII.

ORIGINAL COMMUNICATIONS.

Advent (The) of Dental Science in the United States 713
Alveolar Abscess: Preventive and Curative Treatment 193
Arch or Span Filling 127
Cataphoresis for Obtunding Sensitive Dentine 132
Concerning Vulcanite 727
Contour Filling (The). A Study 321
Dental Education of the Public.. 827
Dental Filling (The) 550
Dental Vulcanite 376
Detachable Porcelains for Crown- and Bridge-Work 636
Differential Diagnosis 621
Disinfection of Pulpless Teeth (The) 829
Do we Know Anything of the Evolution and Etiology of Dental Caries? 898
Effect (The) of Oxidation on Cut Alloys for Dental Amalgams 43
Esthetics in Dentistry 999
Experimental Study of the Different Modes of Protection of the Oral Cavity against Pathogenic Bacteria 797
Fate (The) of Associations 638
Fœtor ex Ore. Pathology and Therapy 626
Formation and Structure of Dental Enamel 101, 269, 453
Four Consolidated Dental Implantations 130
Future (The) of American Dentistry in Europe 911
Gold Filling, with Special Points for Hand Pressure 730
Guaiacocain Cataphoresis, and Local Anesthesia. Outfit and Technique 328
Guaiacol-Cocain Cataphoresis and Local Anesthesia; A New Cataphoric Electrode and the Wheeler Fractional Volt Selector 48
How shall we Make our Local Societies more Attractive and Helpful? 723
Infiltration-Anesthesia in Dentistry 562
Interdental Space Guards 553
Irritative or Reflex Trismus 58
Law of Prevention (The) *vs.* the Law of Cure 54
Left-Cutting Burs 557
Mechanical Appliance (A) for the Replacement of the Right Superior Maxilla, the Face, and a Portion of the Nose..... 559
Medicinal Prevention of Dental Caries 381
Mistakes 537
Molecular Attraction in Root-Filling 379
Needs (The) of Our Profession: How can they Best be Met? .. 369
New Device (A) in Crown- and Bridge-Work 732
Oral Expressions (The) of Malnutrition 486
Orbicularis Oris (The) and the Muscles of Expression 834
Physical Properties of the Silver-Tin Amalgams 965
Plantation of Teeth 185
Practical Utility of Accurate Studies of the Physical Properties of the Teeth and of Filling-Materials 296
Preparation of Pulp-Cavity and Canals 199
Preservation of the Deciduous Teeth by Means of Caps and Crowns 389
Professional Fees 815
Prosthetic Dentistry: the Glenoid Fossa; the Movements of the Mandible; the Cusps of the Teeth 34
Pulpless Teeth, Roots, and their Treatment 554
Pyorrhea Alveolaris 310
Reply to Dr. Andrews (A) 887
Shall it be Cataphoresis? 992
Siegfried's Regulating Spring .. 497
Stomatitis the Cause of Various Throat-Diseases 734
Studies of the Maxillary Bones . 1
Study (A) of the Relation of the Frontal Sinus to the Antrum . 903
Teeth Irregularities and their Surgical Correction 907
Temperaments in Dentistry 917
Treatment and Filling of Devitalized Teeth 373
Treatment of Pyorrhea Alveolaris 881
Treatment of Teeth and Roots preparatory for Crowning ... 205

Treatment of Two Cases of Fracture of the Inferior Maxilla, by Wiring.............. 840
Variations of the Teeth in Relation to Temperament 630
What shall be Done for the Teeth of the Poor? 385
X Ray (The) and Its Application in Dentistry 478

CORRESPONDENCE.

Cataphoresis 735
Letter from Dr. J. Leon Williams 208
Nitrous Oxid and Oxygen 136
Plan (A) for a National Dental Association, divided into Four Co-ordinate District Branches 562
Question (The) of Temperaments 841
Reply to Dr. H. H. Burchard..1004

PAPERS IN SOCIETY PROCEEDINGS.

Approximal Work: the Important Factor Involved 595
Army Medical Museum and Library 682
Artificial Pulps..................1014
Can the Dentine be Reached through Systemic Treatment? 414
Capping Pulps 154
Casting Fillings and Abutments for Bridges 850
Cataphoresis 1028
Cataphoric Medication of the Mouth 400
Cocain 85
Cysts: their Treatment by Curetting 592
Dental Hygiene................1008
Dental Hygiene in our Schools and Colleges 773
Dental Legislation 846
Dental Profession (The): Some Points in its History, its Present Status and Relations, and its Responsibilities and Duties 777
Dental Science, Then and Now. 73
Dentinal Dehydration 137
Dermoid Cysts *versus* Migrated Teeth 586
Diseases of the Oral Cavity a Potent Factor in General Disease 569
Disinfection of the Mouth a Potent Factor in the Treatment of La Grippe 739
Electric Medicamental Diffusion, or "Cataphoresis," and Its Relation to Dental Surgery 210
Evolution in Operative Dentistry from the Electro-Chemical Standpoint............... 602
Heredity and Pre-natal Culture. 643
Lingual Wall (The)............1010
Lining Root-Canals 755
Local Anesthesia and Obtundents 89
Modern Methods of Treating the Maxillary and Other Sinuses of the Cranium 736
Movements of the Mandibular Condyles and Dental Articulation 573
New Method (A) of Closing the Soft Palate 601
Nodule on Apex of Root......1013
Ought the Dentist to be a Graduate in Medicine? 246
Pathology and Therapeutics of Dead Teeth 843
Pyorrhea Alveolaris 660
Report of Committee on Practice to Dental Society of the State of New York 940
Report of Committee on Physiology and Etiology to the American Dental Association. 944
Report of Correspondent to Dental Society of the State of New York.................. 693
Report on Materia Medica and Therapeutics to the American Dental Association 752
Some Notes on the Use of Gold as a Filling-Material.......... 584
Some Practical Points in Porcelain Work 151
Technique and Pathology of the Peridental Membrane 744
Treatment of Oral Acidity, Local and Systemic 420
Treatment of Oral Acidity with Milk of Magnesia 767
Two Cases of Epulic Tumor ... 771

PROCEEDINGS OF SOCIETIES.

Academy of Stomatology....243, 344
Alumni Association of the New York College of Dentistry 255
Alumni Society of the Philadelphia Dental College 427
American Dental Association, 352, 512, 600, 749, 860, 944, 1013
American Medical Association, Section on Dental and Oral Surgery 500, 569, 660, 736

Buffalo Dental Association 701
Chester and Delaware Counties Dental Society 254
Cincinnati Academy of Dentistry 606
Colorado State Dental Association 605
Dental Alumni Association of Los Angeles 173
Dental Society of the State of New York 692, 931
Eighth District Dental Society, State of New York 516
First District Dental Society, State of New York, 65, 210, 342, 1006
Harvard Dental Alumni Association 700
Illinois State Dental Society 605
Interstate Meeting at Excelsior Springs, Mo.................. 642
Maryland State Dental Association 783
Michigan State Dental Society..1032
Minnesota State Dental Association 864
Montana State Dental Association 784
National Association of Dental Faculties 762
National School of Dental Technics 784
New Jersey State Dental Society 783
New York Odontological Society 331, 393, 507, 565
Northeastern Dental Association 356
Odontographic Society of Chicago 91
Pennsylvania Association of Dental Surgeons.............1032
Pennsylvania State Dental Society 137, 921
Quincy Dental Club 174
St. Louis Dental Society 173
San Francisco Dental Association 174
Second District Dental Society, State of New York........... 234
Southern Dental Association, 61, 154, 246, 414, 850, 926, 1007
Union Convention of the Sixth, Seventh, and Eighth District Dental Societies of the State of New York....73, 150, 1025
Union Meeting of the Maryland State Dental Association and the Washington City Dental Society 583, 679, 767, 843
Washington City Dental Society 174
Women's Dental Association of the United States 173, 428, 516

DENTAL COLLEGE COMMENCEMENTS.

American College of Dental Surgery 519
Atlanta Dental College 521
Baltimore College of Dental Surgery 429
Birmingham Dental College 433
Boston Dental College 701
Chicago College of Dental Surgery 517
Cincinnati College of Dental Surgery 520
Cleveland University of Medicine and Surgery, Dental Department 429
Columbian University, Dental Department 521
Harvard University, Dental Department 702
Indiana Dental College 428
Kansas City Dental College 433
Meharry Medical College, Dental Department 434
Missouri Dental College 517
National University, Dental Department 606
New York College of Dentistry 523
Ohio College of Dental Surgery. 520
Ohio Medical University, Dental Department 516
Pennsylvania College of Dental Surgery 431
Philadelphia Dental College.429, 607
Royal College of Dental Surgeons of Ontario 517
Tacoma College of Dental Surgery 784
University College of Medicine, Dental Department 606
University of Buffalo, Dental Department 522
University of California, College of Dentistry 784
University of Iowa, Dental Department 432
University of Maryland, Department of Dental Surgery 434
University of Michigan, Dental Department 785
University of Pennsylvania, Department of Dentistry 607
Vanderbilt University, Dental Department 432
Western Dental College of Kansas City 519
Western Reserve University, Dental Department 608

DENTAL SOCIETY ANNOUNCEMENTS.

Alabama Dental Association 255
Alumni Society Reunion, Baltimore College of Dental Surgery 255
American Dental Association 608
American Dental Society of Europe 524
American Medical Association, Section on Dental and Oral Surgery 435
Chicago Dental Society 437
Colorado State Board of Dental Examiners 524
Dental Society of the State of New York 358
Dental Society of Southwestern Michigan 358, 702
Eastern Illinois Dental Society 175
Eastern Ontario Dental Association 526
First District Dental Society of New York 92
Florida State Dental Society 358
Georgia State Dental Society 438
Harvard Odontological Society. 437
Illinois Board of Dental Examiners 256
Illinois State Dental Society 358
Indiana State Dental Association 525
Interstate Dental Meeting, 174, 357, 524
Kentucky State Dental Association 525
Louisiana State Dental Society. 436
Louisville Odontological Society 437
Massachusetts Board of Registration in Dentistry 525, 950
Minnesota State Dental Association 609
Mississippi Board of Dental Examiners 358
Mississippi Valley Dental Association 359
National Association of Dental Examiners 525
National Association of Dental Faculties 608
New Hampshire Dental Society. 864
New Jersey State Dental Society 608
New Orleans Academy of Stomatology 437
New York Odontological Society 1033
North Carolina State Dental Society 357
Northeastern Dental Association 864
Odontological Society of the National University 702
Officers and Committees of Pennsylvania State Dental Society 435
Pennsylvania State Dental Examining Board 524
Pennsylvania State Dental Society 525
South Carolina State Dental Association 359
South Dakota State Dental Society 438
Southern Dental Association, change in Place of Meeting... 523
Texas Dental Association 436
Topics for Discussion by State and Local Organizations 91
Union Convention in Washington 357
Vermont State Dental Examining Board 175
Vermont State Dental Society, 256, 437
Washington State Dental Society 434
West Virginia State Dental Society 1033
Wisconsin State Dental Society. 524

EDITORIAL.

Card from Dr. Andrews 957
Cataphoresis 256, 702
Chemists *vs.* Dentists 865
Correction 178
Death of Dr. J. D. White 95
Dental Nomenclature 1036
Dental History 789
Dental Pedagogics 92
Dr. Black's Researches 1033
Dr. J. Leon Williams's Letter .. 866
Dr. W. H. Dwinelle 258
Exactness 786
Excess of Matter 363
Glycerol 94
Half-Century Mark (A) in Dental Education 530
Literary Phase (The) of Dentistry 175
Low Bridge Patent Case (The). 363
More After-thoughts 610
Obituary Resolutions 178
"Original Communications" 94
Past the Half-Century Mark 789
Plagiarism 950
"Sartor Resartus" 526
Skiagraphy in Dentistry 529
Some New Developments in Local Anesthesia 609
Study of Chemistry (The) 438
The List Grows 1037
"When Doctors Disagree" 359

BIBLIOGRAPHICAL.

American Text-Book of Prosthetic Dentistry 957
American Year-Book of Medicine and Surgery 259
Catching's Compendium of Practical Dentistry for 1895 445
Dental Materia Medica and Therapeutics (Stocken) 179
Dental Pathology and Therapeutics, in the Form of Questions and Answers (Flagg and Inglis) 178
Diseases of Children's Teeth, their Prevention and Treatment 96
Electricity in Electro-Therapeutics 444
Extraction of the Teeth 870
Gray's Anatomy, Descriptive and Surgical 870
Health Notes for Young Wives. 443
Introduction to Pathology and Morbid Anatomy 258
La Photomicrographie, Histologique et Bacteriologique 1038
Lehrbuch der Conservirenden Zahnheilkunde 706
Manuel du Chirurgeon Dentiste, 1039
Pamphlets Received 98, 445, 1039
Practical Dental Metallurgy (Hodgen) 1037
Principles of Bacteriology 444
Principles and Practice of Dentistry (Harris) 442
Rhymes of the States 959
X Ray (The), or Photography of the Invisible 1038

OBITUARY.

Avery, Henry 1042
Baker, Everett M. 446
Beals, Joseph 445
Bingham, Stillman R. 260
Brown, Charles De C. 789
Carroll, Robert A. 180
Dwinelle, William H. 364
Fogg, Isaac S. 98
Fouke, George S. 447
Hodgen, Isaac N. 180
Hunt, Phineas G. C. 532
Kells, Charles E., Sr. 264
Kidder, A. S. 790
Koecker, L. R. 707
Magill, W. E. 613
Salmon, Ira A. 1040
Shields, Lewis N. 707
Smith, C. Cutler 790
Spalding, C. W. 706
Stearns, G. O. 264
Stebbins, Edwin A. 1041
Taylor, James. 530
Wadsworth, E. C. 179
Wadsworth, H. N. 1039
Wells, A. B. 446
White, John De Haven 363
Williams, Richard S. 533
Resolutions on Death of Dr. W. H. Dwinelle 447
Resolutions on Death of Dr. W. E. Magill 790

DENTAL LEGISLATION.

British Columbia Dental Law... 614
Maryland State Dental Law..... 871

PUBLISHER'S NOTICES.

The Dental Cosmos for 1896.... 96
Close of the Volume 1043

PERISCOPE.

Electro-Guaiacocain Cataphoresis: Its Application to Extraction, Sensitive Dentine, and Exposed Pulps 876
New Regulations (The) relating to the Diploma in Dental Surgery of the Royal College of Surgeons of England 873
Painless Extraction of Teeth.... 878
Surgical Uses of Cocain 1042
Touch Bulbs in Dentine 875

HINTS, QUERIES, AND COMMENTS..181, 265, 448, 533, 614, 708, 791, 959, 1044

MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE....99, 182, 266, 366, 450, 534, 617, 710, 794, 878, 962, 1047

MONTHLY RECORD OF PATENTS RELATING TO DENTISTRY...100, 184, 268, 368, 452, 536, 620, 712, 796, 880, 964, 1048

INDEX TO VOLUME XXXVIII 1049

THE

DENTAL COSMOS.

VOL. XXXVIII. PHILADELPHIA, JANUARY, 1896. No. I.

ORIGINAL COMMUNICATIONS.

STUDIES OF THE MAXILLARY BONES.*

BY M. H. CRYER, M.D., D.D.S., PHILADELPHIA, PA.

(Read before the American Dental Association, August 8, 1895.)

MR. PRESIDENT, LADIES AND GENTLEMEN: I invite your attention to some special studies of the maxillary bones with which I have recently occupied myself. There need be little said of the external surfaces and general shapes of these bones, as they are well described in the leading text-books on anatomy.

The internal structures and their relations to other tissues will be studied from sections made through the jaws in various directions. The main points desired to be brought out are as follows:

First. The relations of the mouth and teeth to the maxillary sinus from fetal life to old age.

Second. The shape and size of the sinus at various stages of development.

Third. The relations of nerves and vessels passing through and along its walls.

Fourth. The opening of the sinus into the nasal chamber.

Fifth. The lateral surfaces of the nasal cavities, showing the complex structures that are associated with the nasal portion of the superior maxilla.

In the lower jaw the studies will consist of,—

First. The U-shaped character of the cortical portion and the cancellated tissue within.

Second. The inferior dental canal, or the "cribriform tube of the inferior maxilla."

Third. The relation of the roots of the teeth to the canal and the surrounding tissue.

Fourth. The manner in which the nerves and vessels reach the teeth.

Fifth. Teeth in their normal and abnormal positions in either jaw.

---

*Copyright, 1895, by M. H. CRYER.

Sixth. Change of cancellated tissue caused by inflammation.

Many of these slides contain several individual studies, and exhaustive discussion on any one will be impracticable. I shall therefore merely refer back to those slides, previously shown, when necessary.

I wish to acknowledge my obligation to Drs. Litch, Darby, Stellwagen, Gleason, and Harrower, for furnishing material from which I made most of the specimens that will be here shown.*

Slide No. 1 represents the antero-lateral view of the skull, giving a general idea of the various external bones of one side of the face and head. The articulation of the teeth is almost normal. It gives the relations of the bone of which we are to speak, to the other external ones. The outer surface of the lateral and anterior wall of the antrum is shown, the teeth having been denuded of the external plate of the alveolar process ; and, so removed, it will be seen that the maxillary sinus has been opened immediately over the roots of the first, second, and third molars, showing how thin, in this case, the bone is between the roots of the teeth and the floor of the sinus. It is also very thin over the points of the roots of the cuspid and first and second bicuspids.

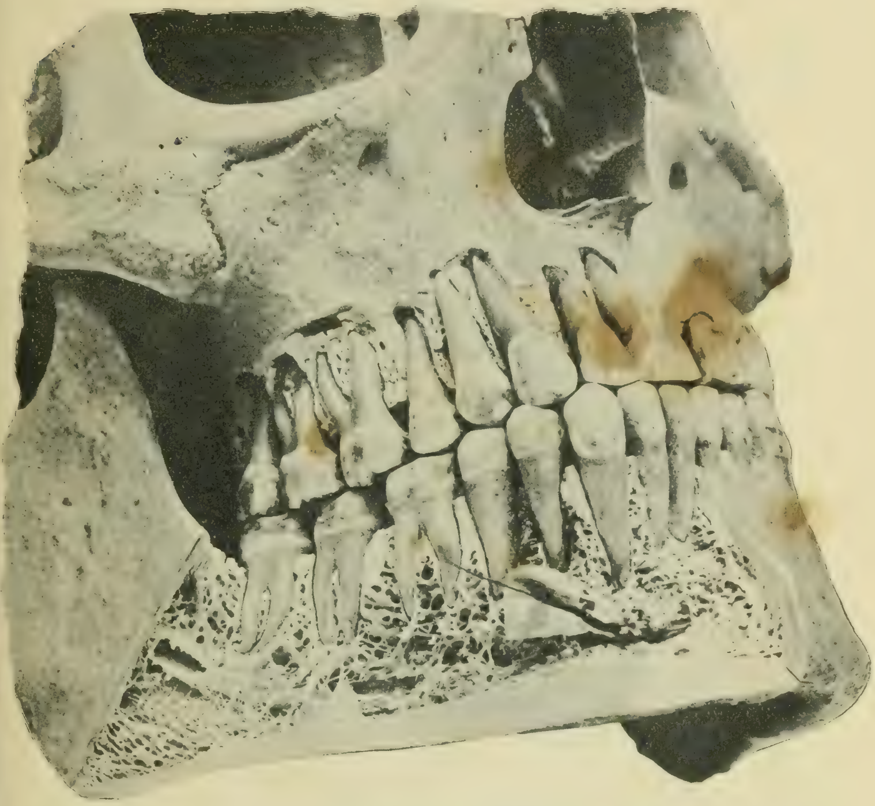
I wish to draw attention to the position of the infraorbital foramen, which is generally described as the termination of the infraorbital canal, which passes through the solid portion of the infraorbital ridge to the groove in the floor of the orbit. Several of the slides to be shown will show that this canal often passes diagonally through the sinus, somewhat in the shape of a tube,—a point I have not noticed described in any work on anatomy. On the inner side of the orbit is the os planum of the ethmoid bone, and at the inner anterior angle will be seen the opening of the nasal duct; these structures will be again referred to when viewing the internal structures of the nose. We will omit speaking of the lower jaw until farther on.

---

* Following is a glossary of the lettering of the illustrations :

1st M., First Molar.
A A, Apical Abscess.
A D C, Anterior Dental Canal.
A E C, Anterior Ethmoid Cells.
A F, Anterior Fossa of Brain-case.
A P, Alveolar Process.
A r 1st M., Anterior Root of First Molar.
C G, Crista Galli.
C L, Crystalline Lenses.
D G, Dental Germs.
Dis r 1st M., Distal Root First Molar.
E T, Eustachian Tube.
F M S, Floor of Maxillary Sinus.
F O, Floor of the Orbit.
F S, Frontal Sinus.
G P D N, Grooves Posterior Dental Nerve.
H P, Hard Palate.
H S, Hiatus Semilunaris.
I, Infundibulum.
I D N, Inferior Dental Nerve.
I F, Infraorbital Foramen.
I F S, Infraorbital Sinus.
I M, Inferior Meatus.
I O C, Infraorbital Canal.
I T, Inferior Turbinated Bone.
L F S, Left Frontal Sinus.
L I, Lateral Incisor.
M B, Malar Bone.
M E C, Middle Ethmoidal Cells.
M F, Muscles of Face.
M M, Middle Meatus.
M S, Maxillary Sinus.
M T, Middle Turbinated Bone.
N C, Nasal Cavity.
N D, Nasal Duct.
N S, Nasal Septum.
O, Orbit.
O M, Opening into Malar Bone.
O M S, Opening Maxillary Sinus.
P E C, Posterior Ethmoidal Cells.
P I C, Piece of Paper passing through Infraorbital Canal.
P N D, Probe in Nasal Duct.
P P F S, Probe passing Frontal Sinus.
P P I M M, Probe passing into Middle Meatus.
R 1st Bi, Root of First Bicuspid.
R 2d Bi, Root of Second Bicuspid.
R 1st M, Root of First Molar.
R 2d M, Roots of Second Molar.
R 3d M, Roots of Third Molar.
R C, Root of Cuspid.
R F S, Right Frontal Sinus.
R L I, Right Lateral Incisor.
R M S, Roof of Maxillary Sinus.
S M, Superior Meatus ; Superior Maxilla.
S N, Septum of Nose.
S S, Sphenoidal Sinus.
S T, Superior Turbinated Bone ; Sella Turcica.
Sec, Section removed.
U P, Unciform Process ; U-shaped portion of Lower Jaw.
V M, Vestibule of Mouth.
W N S, Wall of Nose and Sinus.

FIG. 1.

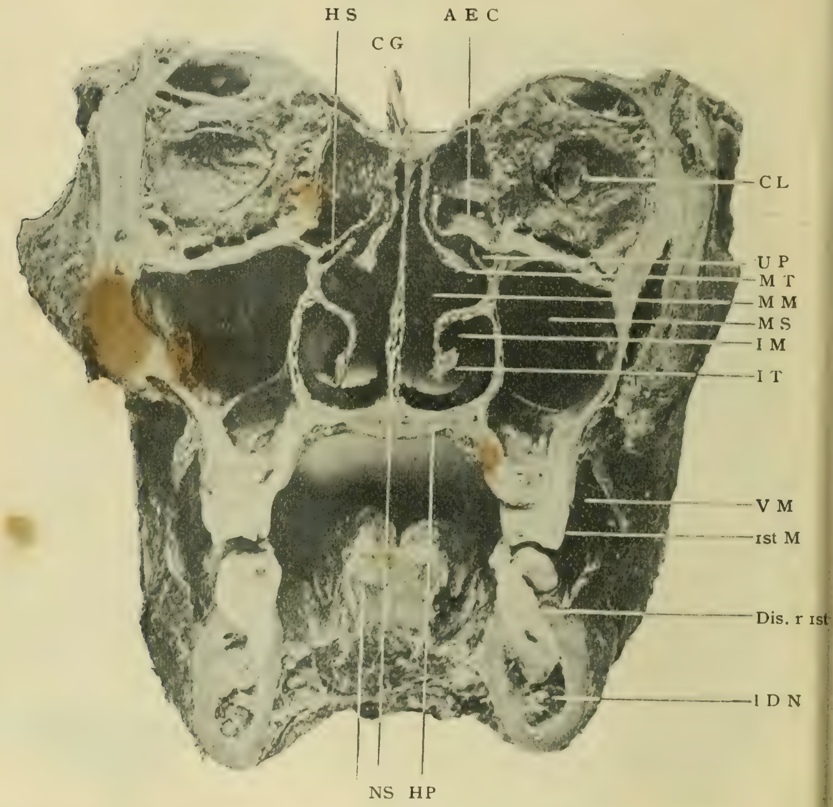


Slide No. 2 shows a perpendicular transverse bilateral section, made by passing through the anterior portion of the orbit, maxillary sinus, and the first molar of each jaw on either side. The eye has been divided just in front of the crystalline lens. Between the upper portion of the nasal cavities are seen portions of the middle ethmoidal cells. In about the center of the floor of the orbit and roof of the sinus, which is very thin in this case, we find the infraorbital nerve in its canal, as generally described, and, below, the nearly triangular cavity of the maxillary sinus is seen, with a partial septum crossing transversely from the inner to the outer wall.

In the angle of the right sinus can be seen the anterior buccal root of the second molar, while on the inner wall is a portion of the palatal root of the first molar. The palatal root of the left first molar is easily seen passing well up in the outer wall of the sinus.

The central portion of this and the following slide gives a fine view of a transverse section of the nasal chamber. The septum in the center is remarkably straight—very seldom found so straight. Above the septum is the crista galli, to which the falx cerebri is attached anteriorly. On either side of the septum, at its upper attachment, is the roof of the nasal chamber. Running down on either side a little distance from this are the middle turbinated bones, the scroll-shaped bones below, hanging from the outer walls, being the inferior turbinated bones. The superior turbinated bones cannot be seen in a section in this position, as they are situated farther back. The space from the under surface of the inferior turbinated bone and the floor of the nasal cavity forms the inferior meatus, into which the lachrymal duct empties the fluid from the eyes. The space between the middle and the inferior turbinated bones is known as the middle meatus, into which the frontal and maxillary sinuses have their openings into the nasal chamber. The fluids from the middle and anterior ethmoidal cells also pass through this meatus. Between the walls of

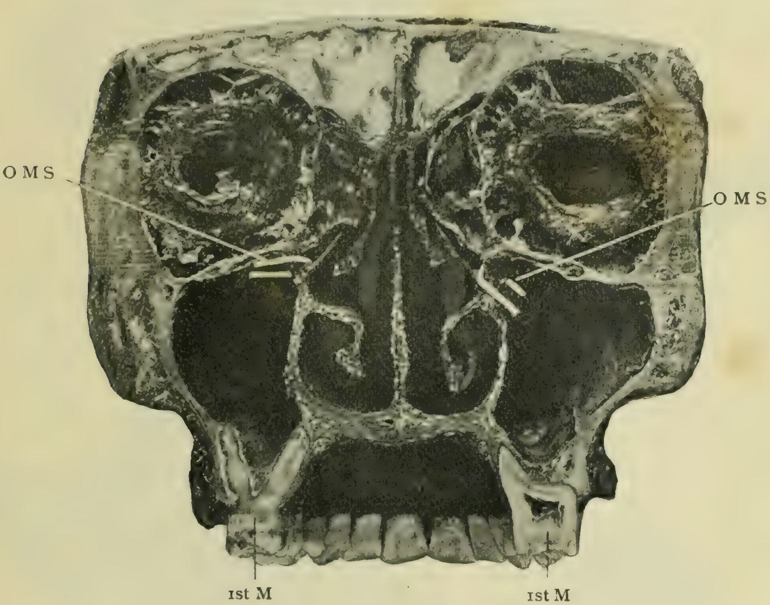
FIG. 2.



the ethmoidal sinuses and the middle turbinated bones is the unciform process. The spaces between this process and the outer walls of the nasal cavities are the semicircular grooves generally known as the hiatus semilunaris. It is in this groove-like place that the excess of fluids passes from the various air-cavities, including the frontal and maxillary sinuses, out of the antrum at its upper anterior corner. Sometimes the opening is in the roof of the sinus, as will be shown. This groove passes backward, the uncinate process forming a guard to the opening of the maxillary sinus and thus preventing any foreign substance passing into the sinus.

We often speak of the fluid passing out of the sinus. It is a question in my mind if such is the case in a normal condition. It is more than likely the law of supply and demand is so governed that the parts are kept moist only, and the opening at the top so arranged as to prevent the undue loss of the fluid.

FIG. 3.



The openings of the maxillary sinuses are at the top, thus preventing drainage while the subject is standing or lying on the back, while the openings of the other air-cells or sinuses are so arranged as to make almost complete drainage.

Sometimes we hear of a "sound" being passed into the maxillary sinus. This cannot be done in a living normal subject.

The dark space external to the teeth is the vestibule of the mouth. The lower portion of the slide, which includes the lower jaw, will be spoken of farther on.

Slide No. 3 represents the anterior portion of the same section. At the upper superior angle is seen a string marking the passage from the antrum into the hiatus semilunaris. In the floor of the antrum will be seen another septum. On the right side of the subject will be observed the anterior buccal and the palatal roots of the first molars. In the outer and inner walls of the antrum, from a dental standpoint, the position of these roots, as shown in this and the last slide,—also in the following one,—should be very interesting. Abscesses of these roots could very easily open into the sinus. The extraction of these teeth, if not carefully done, would carry away part of the floor of the sinus. Also, by using much force in placing artificial crowns, the floor could be easily fractured. In the case of

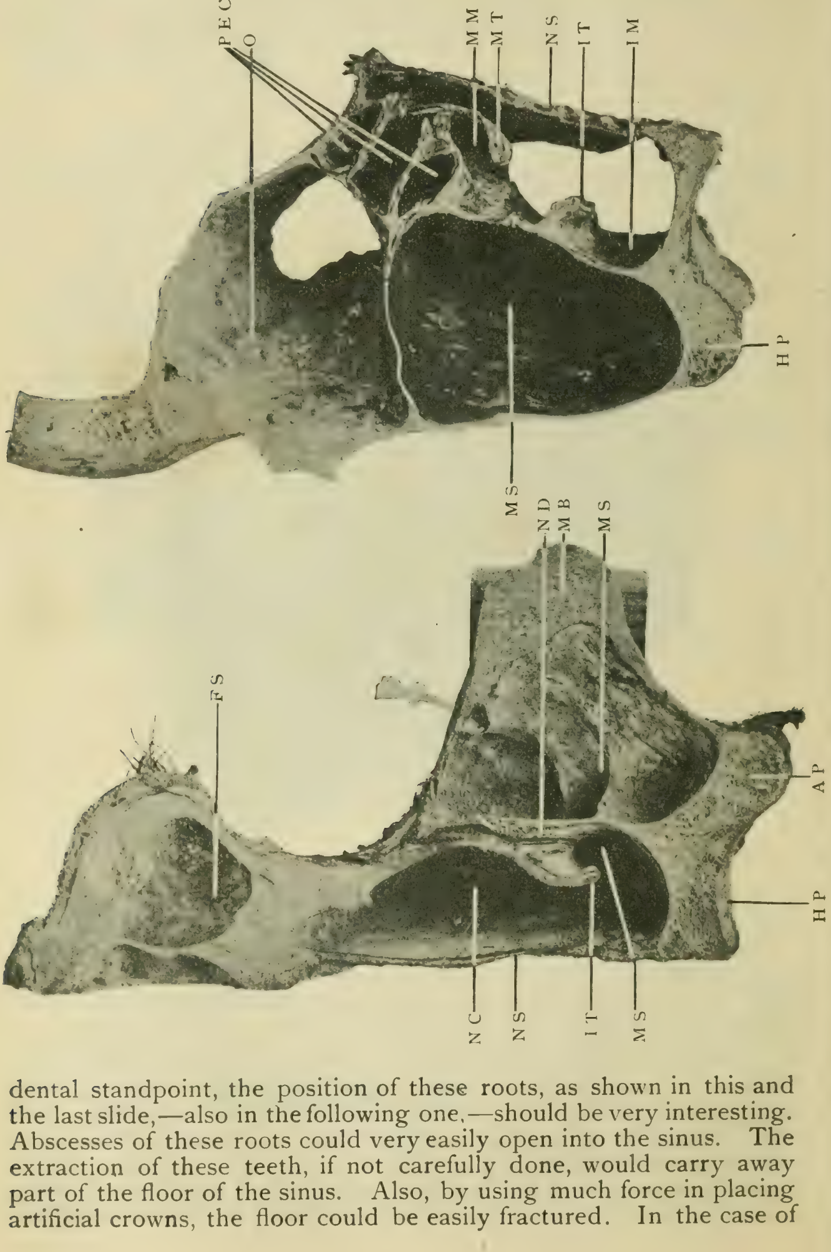


Fig. 4.

a breakage in extracting, the roots could easily be forced into the sinus by the use of root forceps.

In the great majority of skulls examined belonging to the white race, roots of the molar teeth either pass up in the walls of the antrum or point directly to the floor, being covered only by a thin, conical portion of bone ; and occasionally this lamina of bone is lost, leaving the point of the root uncovered. A specimen will be shown where an abscess has broken through this thin partition into the sinus.

In the colored race the walls and the floor are much thicker ; therefore we do not, as a rule, find the roots of the teeth passing up into the wall or even near the floor of the sinus. The relations of the teeth with the sinus vary so much that no set rule can be accepted ; in fact, all the bones and structures of the face vary so in themselves and their relations with other structures that the subject cannot be learned from books or by lectures. The student, under proper guidance, should work the matter out by the use of the saw and chisel. In other words, let him make preparations similar to those from which these photographs have been taken.

Slide No. 4. Here are two pictures. The one on the left side is a section made perpendicularly, transverse just within the infraorbital ridge, by taking off the anterior wall of the maxillary sinus. In the upper portion is the anterior wall of the frontal sinus, on the left side the nasal septum, and within the septum the nasal cavity.

The inferior turbinated bone is seen passing from the external wall of the chamber between the upper portion of the turbinated bone and the nasal wall of the antrum. Here also is seen the anterior half of the nasal duct. Commencing at the inner angle of the orbit and terminating in the inferior meatus, the hard palate and alveolar process are seen. They are both about the same thickness in this specimen. This would not be a good subject for implantation. The right picture is a section made near the posterior wall of the antrum and the orbit, from the same subject as the other. The walls of the antrum, it will be noticed, are very thin, and on the upper right corner will be seen the posterior ethmoidal cells. These exceedingly thin bones generally indicate old age.

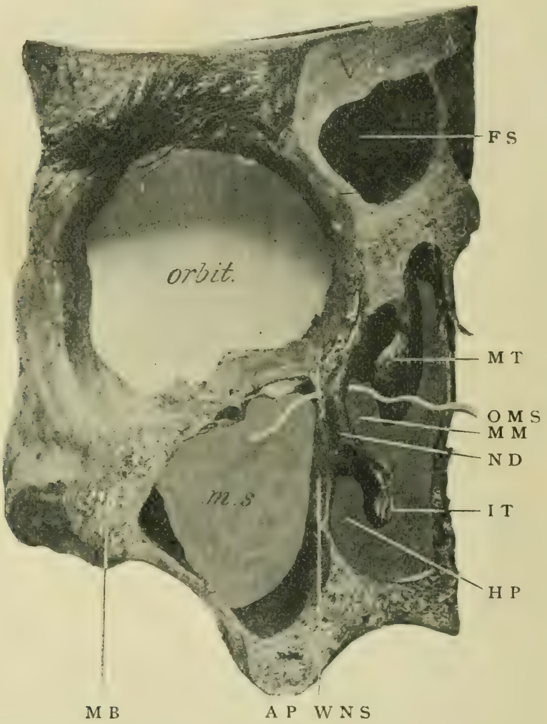
Slide No. 5 is a section immediately between the two just passed, showing its anterior surface. On the upper right corner is the frontal sinus. These sinuses vary much in size and shape ; the left may pass far over to the right, or *vice versa.*

To the left is the orbit with part of the eyebrows showing. In the center of the wall between the orbit and the sinus will be seen the infraorbital canal, below which is the maxillary sinus, which in this case is very large. In the upper portion of the nasal chamber is seen the middle turbinated bone, below which there is a string passing through the middle meatus into the opening of the maxillary sinus. The posterior half of the nasal duct is shown, passing from the inner angle of the orbit to the inferior meatus.

The hard palate and the alveolar process is again shown to be about the same thickness.

Slide No. 6, showing two pictures, the left one being removed from in front of the right one. When speaking of the first slide, the general description of the infraorbital canal was given. This slide, and a few others following, will show that the description given will not answer for all. These sections were made by removing the anterior wall of the antrum, passing perpendicularly downward. From the center of the floor of the orbit there is a septum, cutting off a portion of the sinus, forming an infraorbital sinus, which of course is continuous with the true sinus. In the center of this septum-like wall will be seen a tube-like canal with the infraorbital nerve in place. Above this and at the junction of the septum to the floor of the orbit is an adjunct infraorbital nerve and canal. At the right, marked H S, is the hiatus semilunaris, into which there are many openings, among which that to the maxillary sinus.

FIG. 5.



In the right-hand picture, to the left of the septum is the opening from the infraorbital sinus into the true maxillary sinus. In the upper right-hand corner of the sinus the opening into the nasal chamber is well shown, passing into the hiatus semilunaris, guarded by the unciform process.

Slide No. 7 is a sagittal section just external to the infraorbital foramen. In the left picture there is, passing through the foramen and the canal, a piece of paper showing its direction, with a clear space over the tube-like canal. Another point of interest in this picture is the elevation of the bone over the roots of the first and second molars. Also within the floor of the sinus will be seen an opening through which an abscess has broken into the antrum from the palatal root of the first molar.

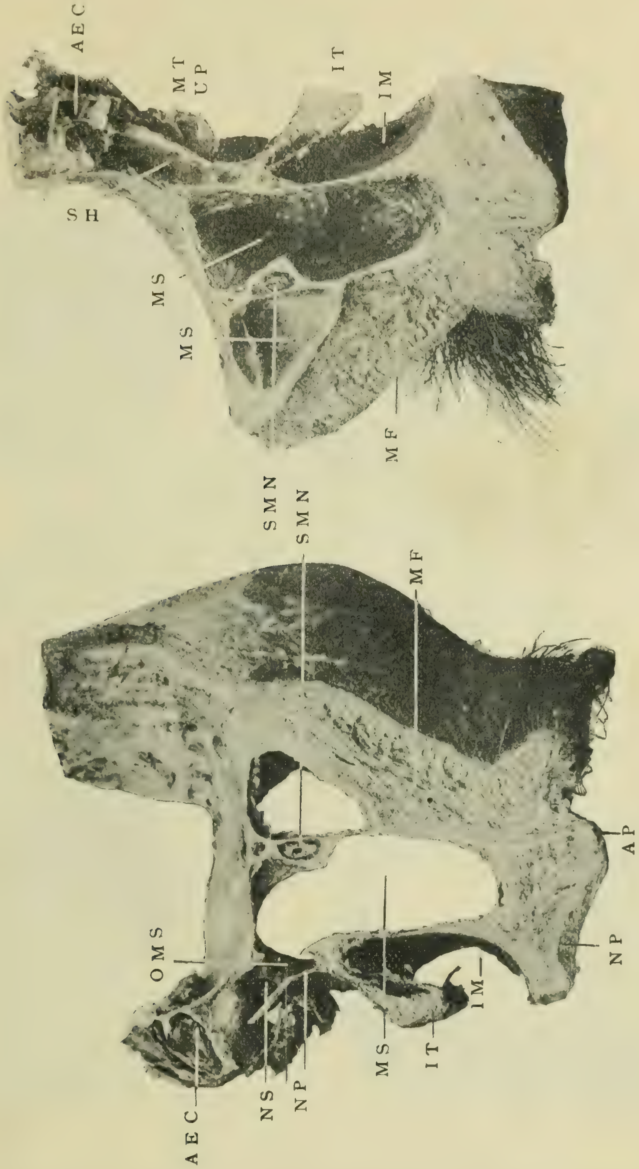


FIG. 6.

There are also elevations in the specimen over the roots of the first and second bicuspids, not seen in the picture.

In the left upper corner of the right picture is the outer portion of the infraorbital sinus, the lower border of which is about on a level with the tube for the passage of the infraorbital nerve and vessels. Below this process is an opening through the external wall of the maxillary bone. In this case the maxillary sinus extends into the malar bone. The teeth shown are the outer sections of those seen in the left picture.

FIG. 7.

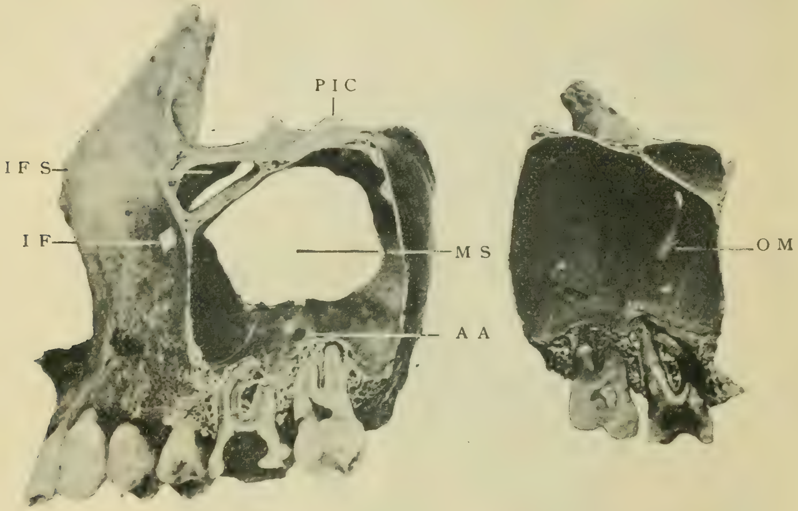
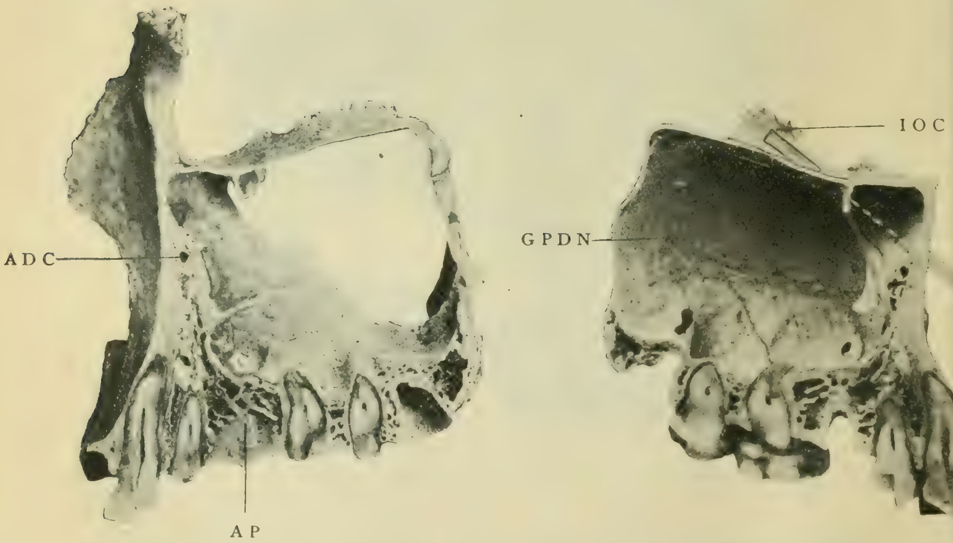


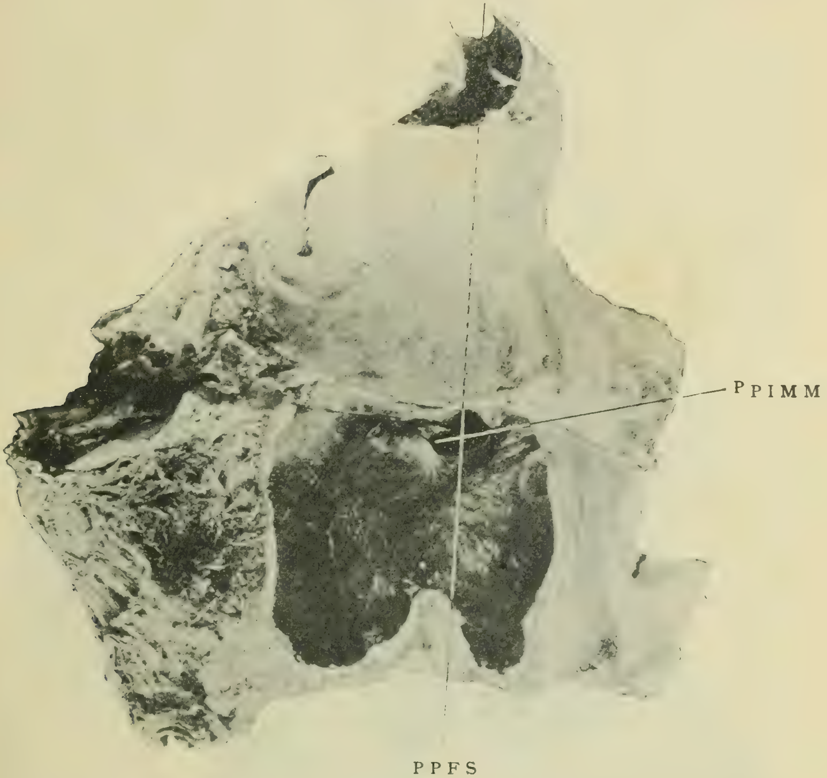
FIG. 8.



Slide No. 8 is somewhat similar to the last one, being a sagittal section made internal to the infraorbital foramen. Here again the tube-like canal passes below an infraorbital sinus, a division of the true antrum. In the left picture, on the outer wall of the sinus will be seen grooves, the principal one running somewhat horizontally forward, giving off branches to the roots of the teeth.

It is often described that the artery and nerve pass to the teeth in the substance of the bone, from the posterior dental foramen in the tuberosity of the bone, and branches are given off in the bony structure.

FIG. 9.



This is the case only where the alveolar process is very thick and the sinus very small, and the roots of the teeth are not merely covered by a conical portion of bone in the floor of the antrum. But it is found in nearly all cases as shown, the nerves and vessels pass into the posterior dental foramen, then go through the bone into the sinus, passing into a horizontal groove, small branches passing from that to the teeth, the vessels and nerves being covered by the mucoperiosteum while within the antrum.

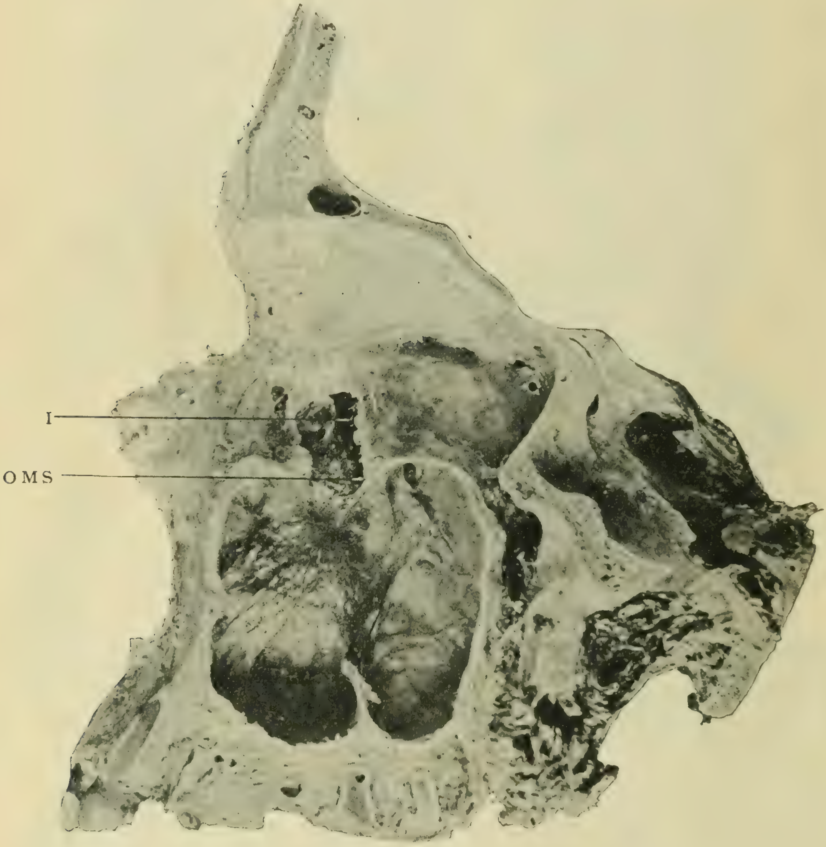
Sometimes these grooves pass into small canals for a short distance. Immediately below the septum of the sinus in the anterior wall are seen several small openings for the passage of nerves and vessels to the anterior teeth and surrounding tissue.

In the floor of the antrum will be seen the conical cap to the roots of the teeth. Posteriorly is an opening over the buccal root of the third molar, anteriorly is an opening over the root of the second bicuspid.

The large opening in the right picture is the ordinary one found leading into the nasal cavity, as seen in the dried unarticulated bone.

Slide No. 9 is a sagittal section made near the inner wall of the orbit. The frontal sinus is seen at the top, and below this is the inner wall of the orbit, os planum of the ethmoid, including the edge of inner portion of the floor, below which is the internal wall of the maxillary sinus. At the bottom will be seen an elevation of a tooth-socket. This specimen is made from an almost edentulous person.

FIG. 10.



It is my opinion, as the teeth are lost, these elevations disappear and the floor of the antrum becomes smooth and comparatively even. The small divisions or septa, as shown in the second and third slides, disappear with age.

To locate the opening and the direction in which the excess of fluid would pass from the sinus, a wire has been passed backward into the hiatus semilunaris. A perpendicular probe passes through the upper portion of the opening of the sinus, which in this case is partly in its roof or at the angle of the internal wall and the roof; as the straight probe passes out of the antrum, it passes through the infundibulum into the frontal sinus, showing that fluids could pass directly downward from the frontal into the maxillary sinus. These are specimens showing where the anterior ethmoidal cells open just at the maxillary sinus. If the hiatus semilunaris should be closed by pressure of the septum or inflammation of the mucous membrane, the fluids from the frontal and ethmoidal cells would pass into the antrum.

I had a patient during the past winter and spring who was troubled in this way, which caused a fistulous opening into the mouth. The sinus was treated for several months without success. The natural opening of the sinus was closed, as proved by forced injections into the fistular opening in the sinus. The fluid would not pass into the nasal chamber, and finally a large opening was made in the outer wall of the sinus, in order to make a better examination with the finger.

There was found a small tumor just below the natural opening. A curved probe could be passed through the opening, in the direction of the frontal sinus. The tumor was then removed and a good-sized opening made into the nasal cavity, the patient recovering in a very short time.

Slide No. 10 is from a similar section of a different subject. It shows the opening of the sinus, running upward, where a small portion of bone has been cut away.

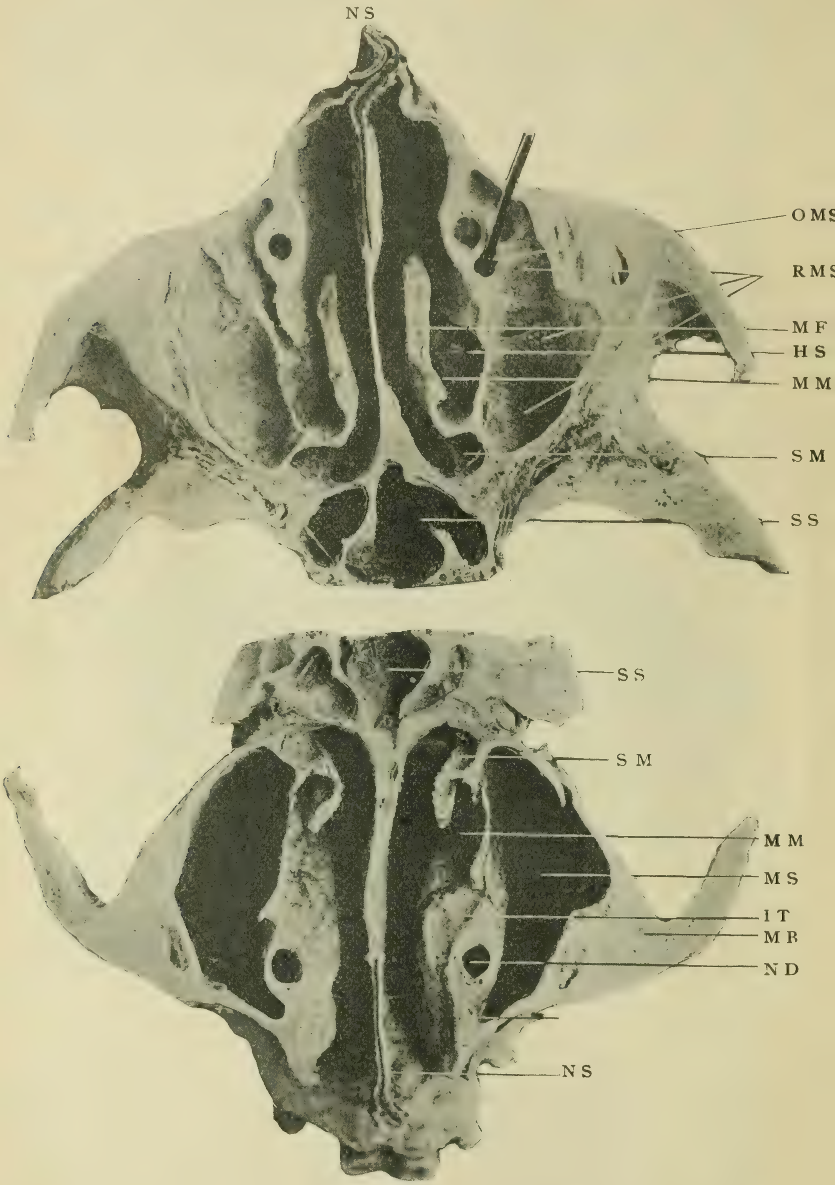
Slide No. 11 is a horizontal section made just below the floor of the orbit, the upper picture showing the roof of the two sinuses, with the nasal chamber and its septum between them. It will be observed that the openings of the sinuses were in the roof; on the left side there is a small probe passed into it, on the right side a portion of bone is cut away, to show the direction of the canal-like opening. In the lower picture a fair idea of the shape of the upper portion of the sinus is given. The two round openings seen on either side are for the passage of the lachrymal duct.

Slide 12 represents a section made from the same subject as the last one. It is a horizontal one, made through the middle of the orbit, and gives a good view of the anterior, middle, and posterior ethmoidal cells, and the septum of the nose at its upper portion.

Slide No. 13 is from a transverse section of a superior maxilla. The right picture is made a little above the floor of the sinus. It shows the elevations and depressions in the floor; in the center of the largest depression there is a small spicula of bone, an exostosis, caused by an abscess of the palatal root of the second molar; on the rim of bone just in front of the sinus is a canal for the passage of nerves and vessels to the anterior teeth. The center picture shows where a section has been made a little lower down, through many of the roots of the teeth, although leaving portions of the floor of the sinus in two places. The point of the palatal root of the first molar is in view, with a large opening on its posterior aspect, caused by the abscess spoken of. The left picture is the cap turned over from the middle one.

Slide No. 14 is made from the skull of a seven-months' embryo. It is a transverse perpendicular section, just within the floor of the

FIG. 11.



orbit. In the upper portion will be seen two openings into the brain-case, with the crista galli and the falx cerebri between them ; below this the nasal chamber, with its septum. Hanging from the outer walls of the chamber are the middle and inferior turbinated bones. In the middle meatus there is seen the unciform process, passing upward and a little inward from the base of the inferior turbinated bones. To the outer side of this process is the hiatus semilunaris, from which there is a small opening passing into the maxillary sinus, which is very small at this period of embryonic life.

FIG. 12.

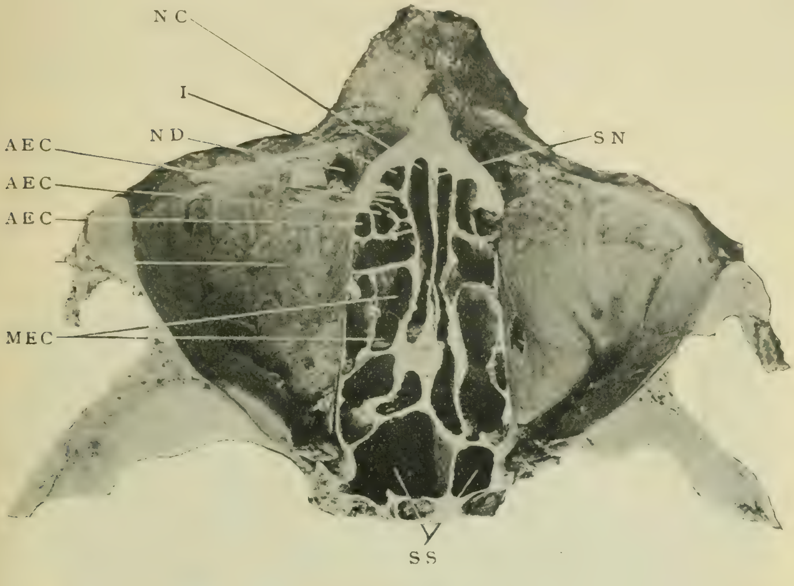
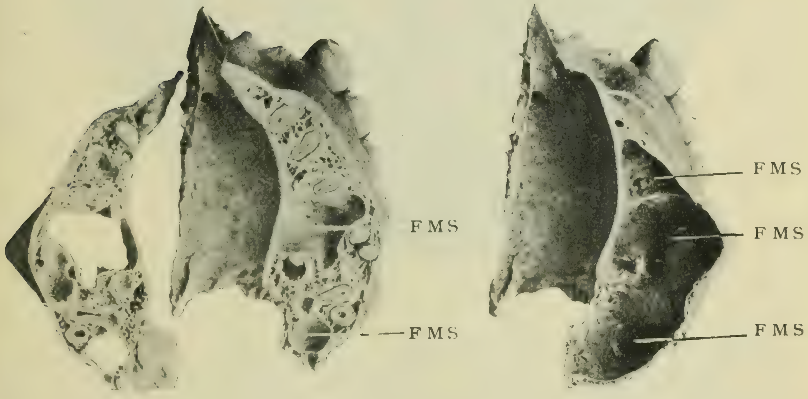
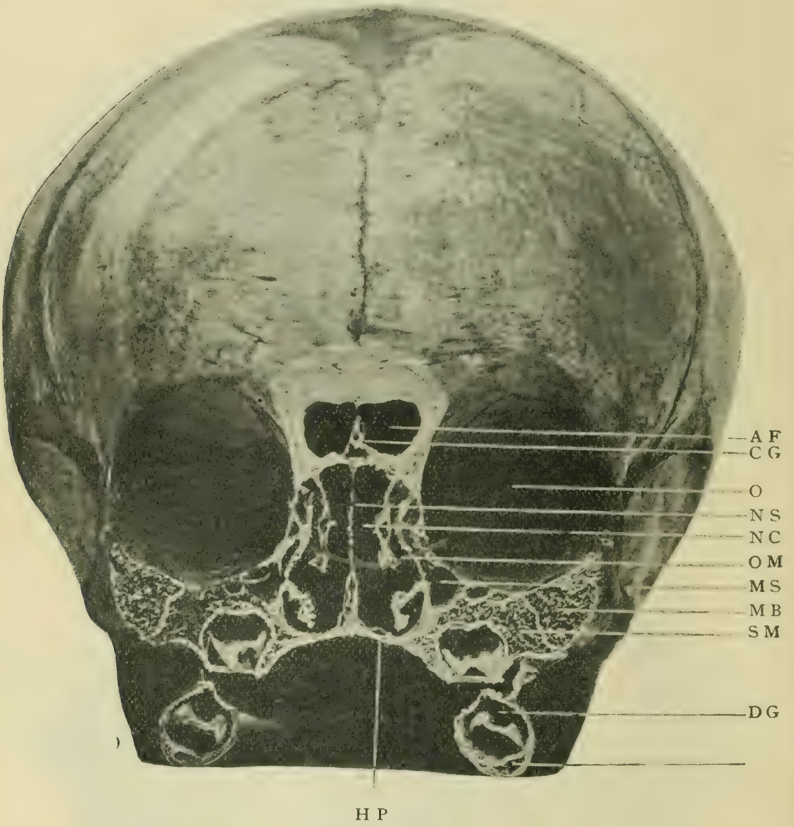


FIG. 13.



The development of the sinus commences about the fourth month of fetal life by an invagination of the lining membrane of the nose within the hiatus semilunaris, in the position as shown in the picture. At the time the invagination commences and until the eruption of the permanent teeth, the greater portion of the superior maxilla is occupied by dental organs. As the invagination takes place and progresses, the cancellated portion of the bone becomes absorbed. This absorption of the internal portion of the superior maxilla is carried on in various degrees throughout life, until in old age the walls become exceedingly thin, as shown in slide No. 4. As this absorption takes place, the roots of the bicuspids and molars are encroached upon until in many cases the points of the roots are

FIG. 14



covered only by a very thin lamina of bone ; even this is sometimes lost, leaving only the muco-periosteum. The re-absorption and enlargement of the sinus occasionally extends into the malar bone, as shown in slide No. 7. At first the sinus is somewhat spheroidal, but it eventually takes a more triangular shape.

The dividing lines between the malar and the maxillary bones are plainly seen. In the lower jaw it will be observed how much space is occupied by the germs of the teeth, leaving very little space below for nerves and vessels.

Slide No. 15 represents three permanent teeth, a central, lateral, and cuspid, that were removed from a living subject about eight years ago. The patient was past middle life and suffering from neuralgia. He had no teeth in the process of the right upper maxillary bone, the region of his pain. Most of them had been extracted in the hope of giving relief.

The antrum was opened by Dr. Garretson and myself in search of the cause. We were somewhat surprised to see the three crowns protruding into the sinus; the roots were imbedded in the inner angle of the wall of the sinus. After being extracted by a small tooth forceps the parts were treated in the usual way, and relief with subsequent cure was secured to the patient.

FIG. 15.

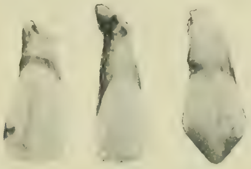
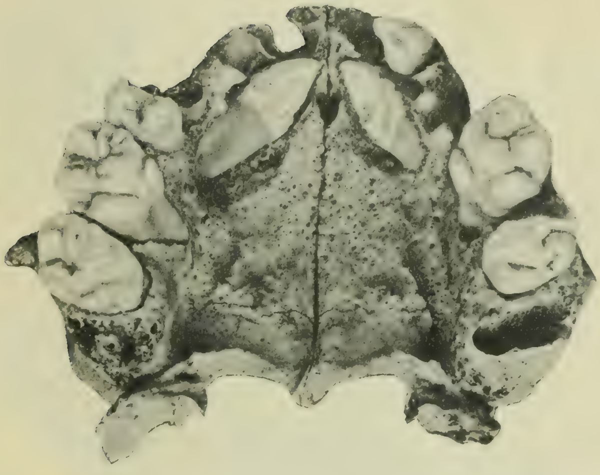


FIG. 16.



The crowns, it will be seen, are normal in shape and quite healthy, the roots being more or less defective. The pulps were alive, and it might be said that the nerves were being infringed upon at the points of the roots, thus causing the pain. I have seen several cases where a greater portion of a tooth was found within the antrum, but I think this is the only case where three have been reported.

Slide No. 16 represents two cuspids impacted in the upper jaw, lying at nearly right angles to each other. They were entirely covered by bone, and were exposed by a dental bur. The end of the root of the right one is somewhat curved. There is but a slight

FIG. 17.

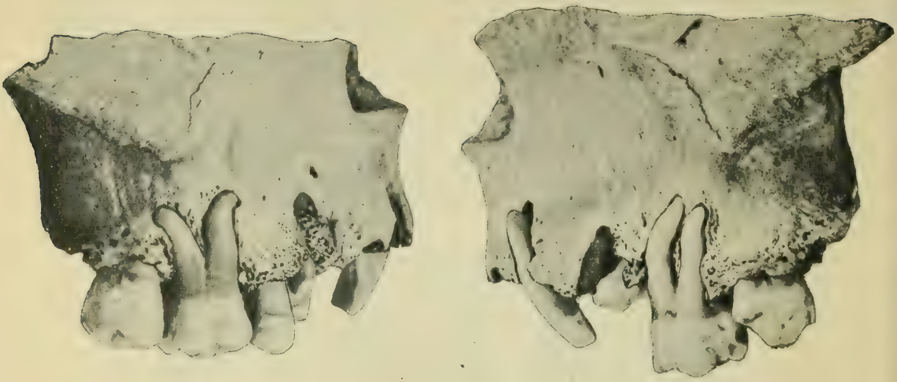
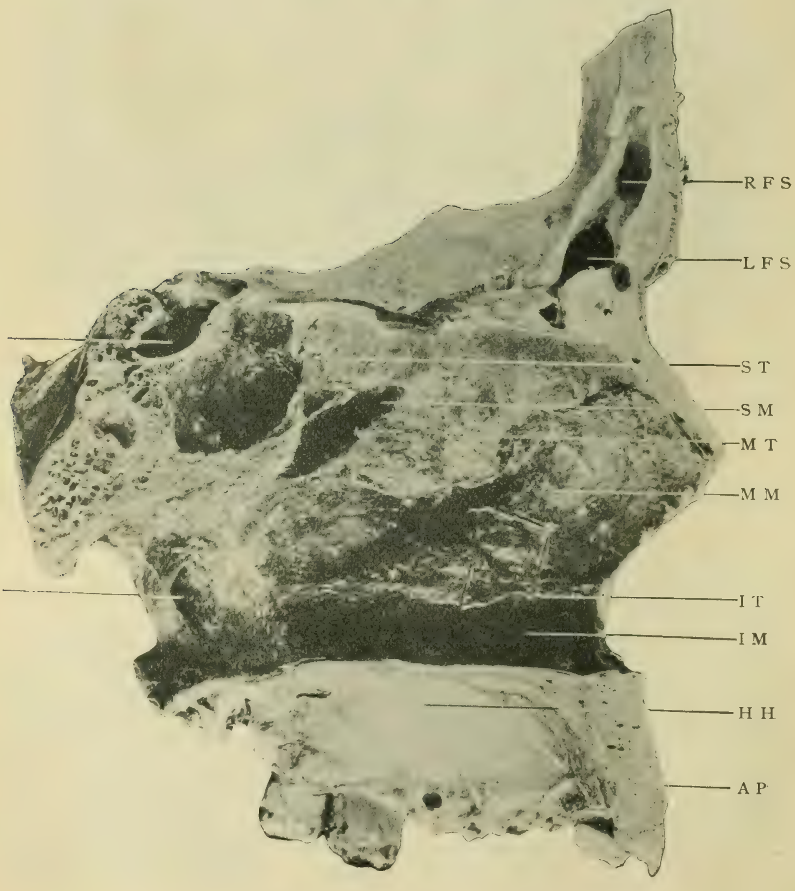


FIG. 18.

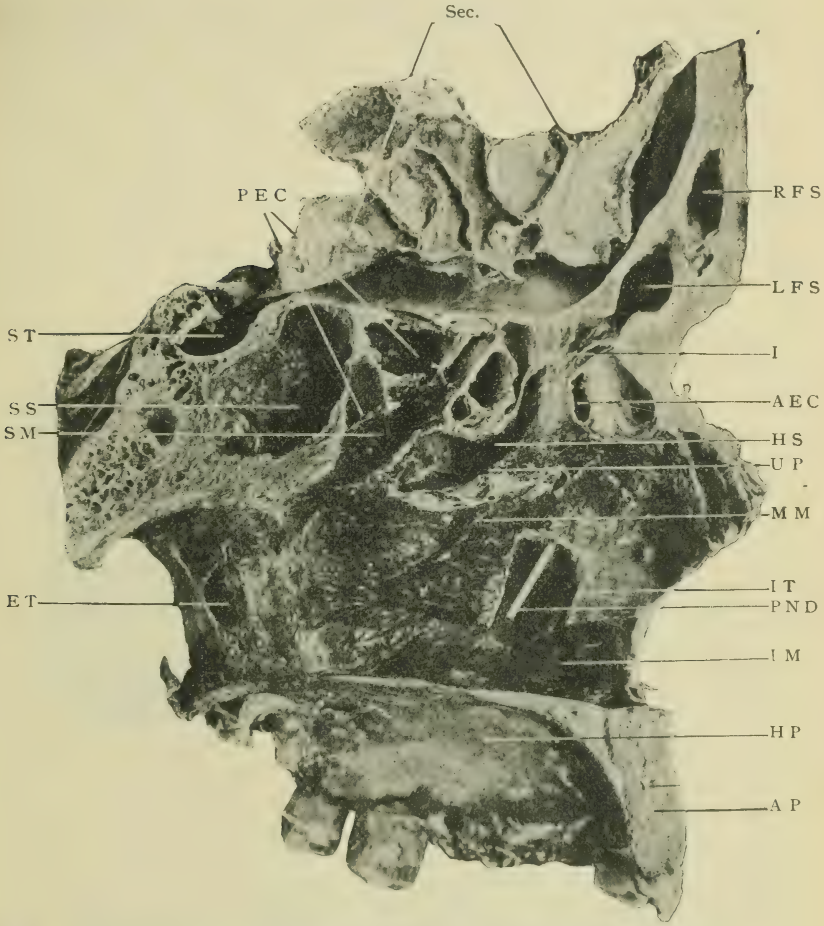


layer of bone between it and and the floor of the sinus, it being perforated by three small openings.

The roots of each tooth lie across the alveolar process, which has prevented the second bicuspids from being fully developed. The end of the right lateral incisor has been pushed out of the process altogether.

Slide No. 17 is made from the same jaw as the preceding one; it gives a view of right and left sides. It will be observed that the roots of the first molars on either side differ very much from each other. The end of the root of the right lateral shown in the right picture has been forced out of its true position by the impacted cuspid of that side.

FIG. 19.



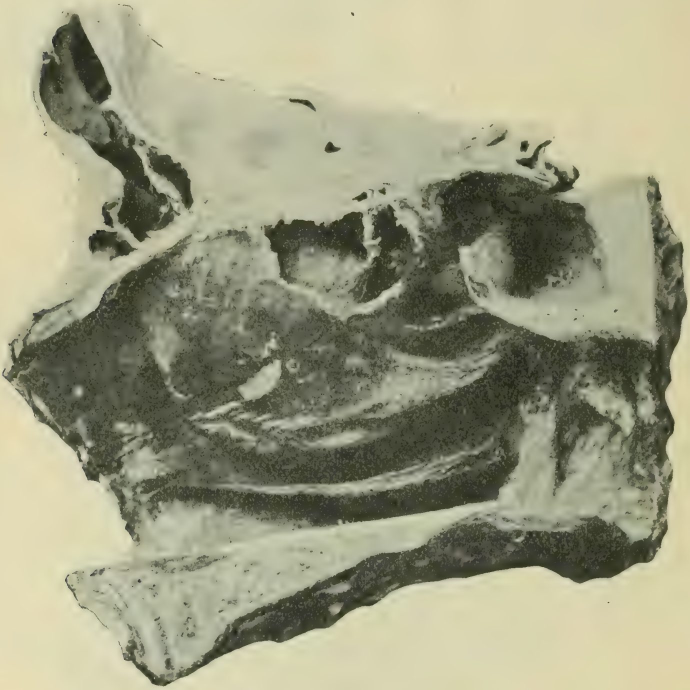
Slide No. 18 is a lateral view of the nasal chamber, showing the three turbinated bones and three meati in the central portion. The frontal sinus is large and well shown. At the right hand upper corner the sphenoidal sinus is shown.

Slide No. 19. This slide is made from the same specimen as slide

No. 18, having a greater portion of the inferior and part of the superior turbinated bones removed and turned upward, showing the inside of a lid and the cells below. A section of the inferior turbinated bone is removed, showing a probe passed into the lachrymal duct. The frontal sinuses are well shown, the upper one being the left sinus as it passes over from the left side ; the under one is the right sinus passing inward and upward beyond the left, there being a very thin lamina of bone between them.

The infundibulum is plainly seen passing to the hiatus semilunaris. The hook-like process seen just below the infundibulum is the unciform process. In the recess back of this is the passage to the maxillary sinus, the process acting as a guard to the opening, and preventing a sound from being passed into the sinus in normal skulls. The anterior middle and posterior ethmoidal cells, and the sphenoidal sinus, are well shown. In the posterior part of the nasal chamber the opening to the Eustachian tube is seen.

FIG. 20.



Slide No. 20. Usually there are three scrolls or turbinated bones, but this specimen shows three well-marked ones and two smaller ones, making five meati and five turbinated bones. In many animals, as the dog and hog, the upper portion of the nose, or that which presides over olfaction, is filled with a large number of scrolls.

Slide No. 1 is the first shown for illustrating the upper jaw. It will now be used to describe the lower one. The lower jaw is made up of a U-shaped cortical or dense bony structure, the ends of the U terminating in the plates of the alveolar process. It may be said to be open at the top, and in normal conditions the teeth are inserted into this U-shaped space. A slightly compact tissue, somewhat cribriform in character, surrounds each tooth. The remainder of the space is filled with fine trabeculæ, forming the cancellated tissue through which passes the inferior dental canal, which I prefer to call the "cribriform tube of the inferior maxilla." It passes from the inferior dental foramen forward on the inner side of the ramus of the jaw, downward and forward through this U-shaped space to near the incisors. At first it passes along or near the inner cortical portion of bone; when it gets near the mental foramen it crosses over nearly to the outer cortical wall. Its depth after leaving the ramus is in the lower portion of the U-shaped space, and passes beneath the level of the mental foramen. This tube can be isolated or removed from a normal specimen, as shown in slide No. 22.

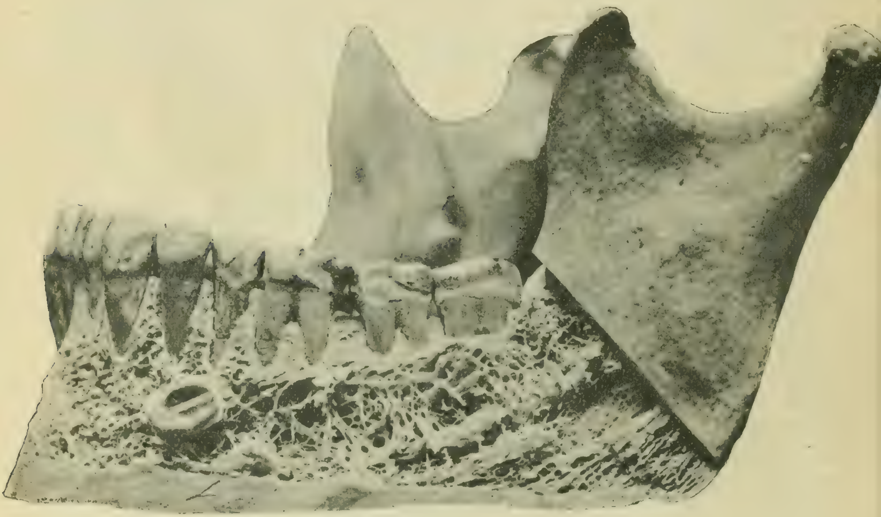
As the tube passes along it becomes more and more cribriform. Beneath the first molar it becomes so opened that the tube character is almost lost, but passing forward it again resumes its original character.

From this main cribriform tube there are lesser branches passing to convey vessels and nerves to the substance of the bone; also in more or less curved course to the roots of each tooth. A little anterior to the mental foramen there is a cribriform tube passing backward from the main tube to the foramen for the accommodation of the mental nerves and vessels. This return canal is almost invariably the normal arrangement, but occasionally this tube passes from the main tube as it approaches the foramen. It will be seen in the picture that the anterior portion of the wall of the mental foramen has been cut away, thus showing the direction of the returned tube.

The small lateral tubes which serve as nerve-conduits from the main tube to the roots of the teeth pass upward and forward in a more or less curved direction, varying according to the position of the tooth, those going to the third molar passing almost vertically upward; in those to the second molar the forward direction is greater; in those to the first molar it is increased still more; the one to the second bicuspid has the longest curve of all. Sometimes, instead of commencing at the main tube, this one is an offshoot of the tube to the anterior root of the first molar. The tubes going to the before-mentioned teeth all curve forward and upward from the main tube posterior to the mental foramen. The small tubes going to the roots of the first bicuspid and cuspid are branches from the recurrent tube to the mental foramen, and are curved slightly backward as they pass to these teeth. The tubes going to the two incisors curve slightly forward as they pass upward to the roots. The finer tubes going to the interspaces and general cancellated tissue have the same general direction and curvature as those going to the roots of the teeth in their immediate vicinity.

The cortical U-shaped portion of the bone is the framework of the jaw, and forms the supporting structure; but it increases in length and breadth in a different manner from its contents. It is more than likely that it grows by interstitial process, each half having three fixed points,—viz, the ramus, the mental foramen, and the symphysis menti. There is no doubt that the distances between these points increase. The contents of this U-shaped space slide forward as the cortical structure increases in length, the teeth posterior to the mental foramen being pushed forward by each successively erupting molar, thus giving the curvature to the various small tubes going to the roots of the teeth, etc., and accounting for the stretching of the main tube until its character is almost lost under the first molar. This also explains the recurrent feature of the tube in relation to the mental foramen. As its end is attached to the walls of the foramen, the mass of cancellated tissue is pushed forward in its process of growth, and the tube itself is carried with it, making a loop. The reason that the small tubes going to the first bicuspid and cuspid curve backward is that their points of origin have been carried forward with the return tube, as they belong to that portion of the tube. The small tubes going to the incisors curve slightly forward as they arrive from the continuation of the main tube near the point where it curves backward to the foramen.

FIG. 21.



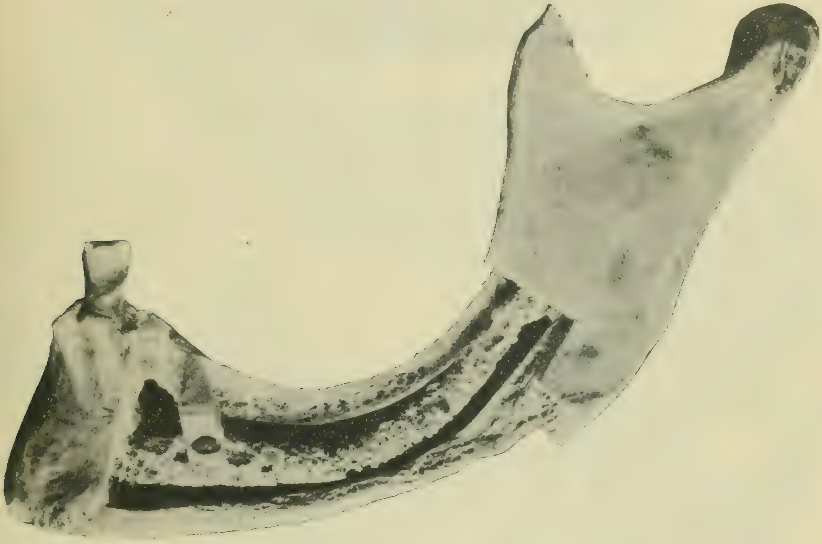
Thus we see that the anatomical structure, the relations of the various teeth considered in connection with the order of their development, and more especially the direction which the lateral branches of the main cribriform tube take in connection with the roots of the several teeth, furnish us with a permanent record of the method of growth of the inferior maxilla during the period between childhood and adult life.

Slide No. 21 is the left side of the lower jaw of slide No. 1. It is enlarged, showing the fine net-work of the cribriform tubes throughout the cancellated tissue; in fact, they form the greater portion of it, the special ones going in slightly curved direction to the roots of the teeth. A wire in the mental foramen gives the direction of the return tube or canal.

Slide No. 22 is taken from a specimen where the cortical and cancellated tissues have been cut away, leaving the cribriform tube isolated, showing it as an independent structure, and not merely a canal through the bone.

Slide No. 2, repeated. The right side gives a good idea of the U-shaped cortical portion of the bone heretofore spoken of, with the root passing into it. Below the root is the cribriform tube and the nerves situated within it. This gives an idea of the position of the nerves below the root of the first molar. It can be imagined what damage would be caused by a discharge of infectious matter from this root within this cancellated tissue.

FIG. 22.



The slide also shows the floor of the mouth and tongue cut transversely.

Slide No. 23 shows the anterior portion of the lower teeth in position. The principal object in showing this slide is to explain why it is often difficult to extract the second bicuspid in a jaw that has lost no teeth. It will be seen in this case that in a transverse section the roots of the second bicuspid are nearly in a line transverse with the anterior root of the first molar. The roots are also very long, extending below the root of the molar and nearly down to the inferior dental nerve. The bone at this point is usually more compact than farther back. Taking these points into consideration, this accounts for the difficulty in extracting these teeth without breaking them, and of course we must also consider that the root itself is not a strong one.

Slide No. 24 represents the lower jaw cut lengthwise nearly through its center, exposing the cancellated tissue, the sockets of the teeth, and the cribriform tube or inferior dental canal, with its branches going to the sockets of the teeth. As the tissue is very frail, much of the trabeculæ is lost. The outer section shows the direction of the recurrent tube for the accommodation of the mental nerve and vessels.

FIG. 23.

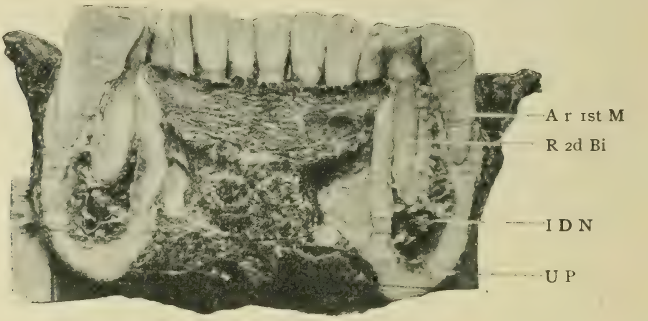
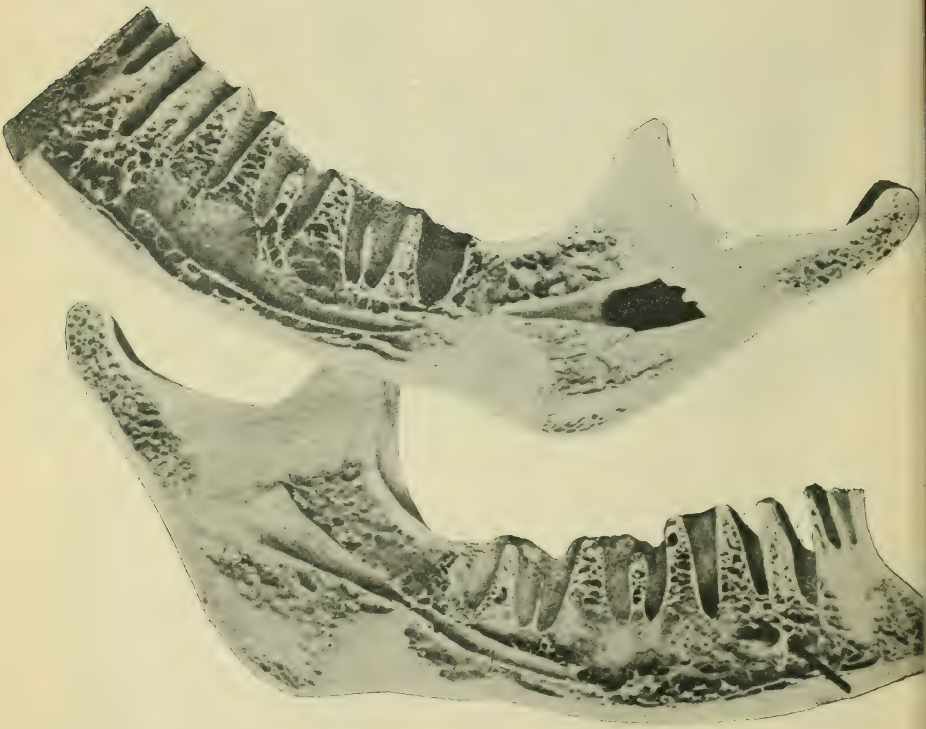
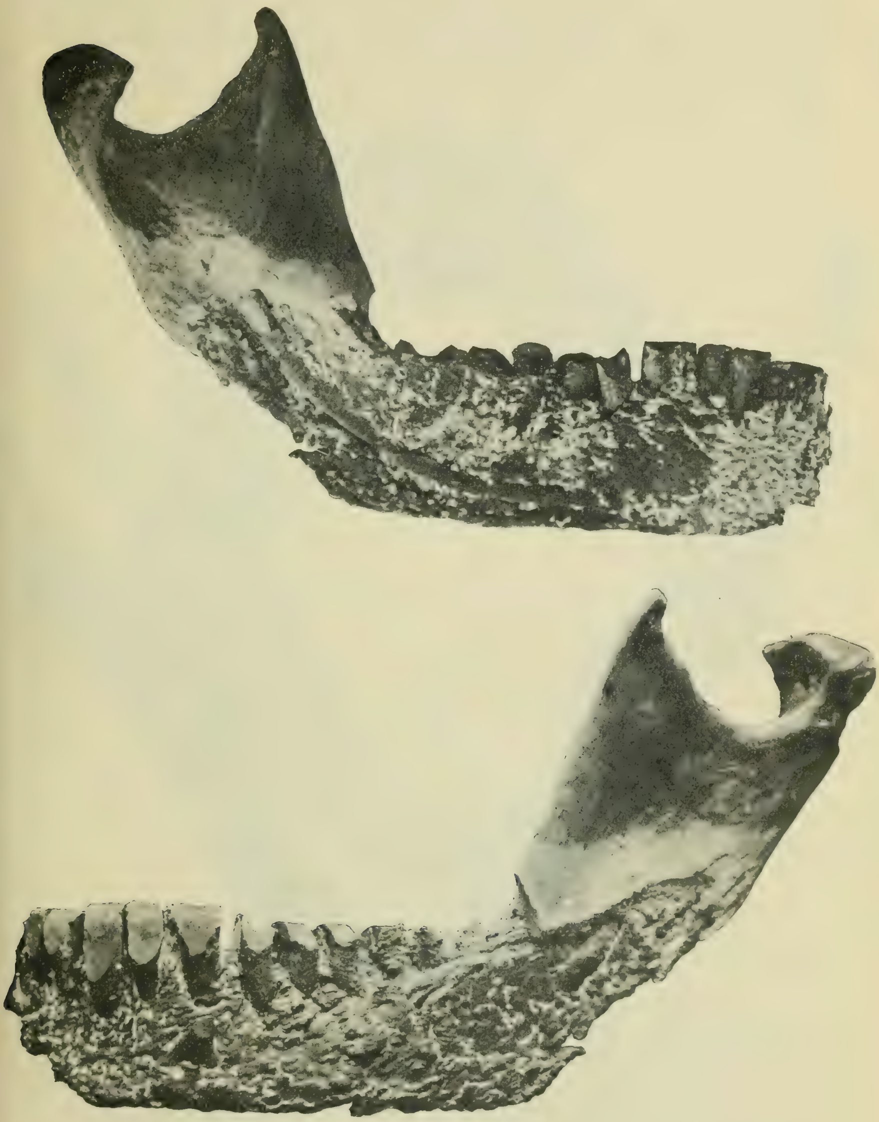


FIG. 24.



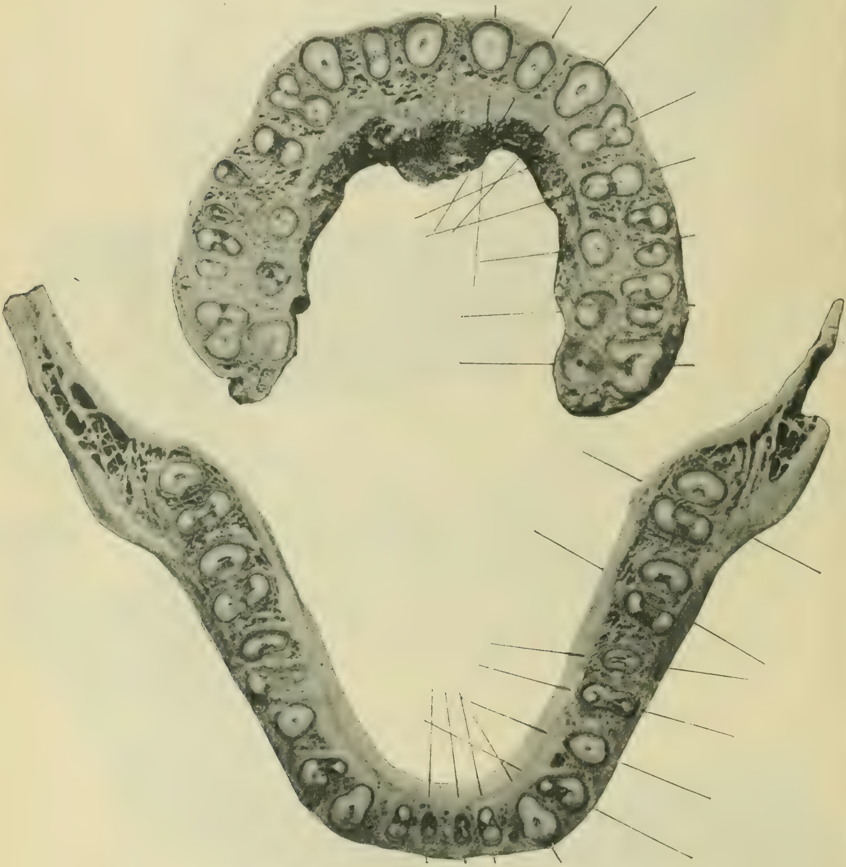
Slide No. 25 represents a metal cast showing the size of the cancellated structure within the U-shaped portion of the body of the bone. It was made in the following way: After the openings of the sockets of the teeth were covered by pieces of paper, a slender tube about eighteen inches long was attached so its lower opening was in connection with the inferior dental foramen. The bone and the lower end of the tube were invested in plaster of Paris with a little asbestos. After it was thoroughly set and dried, and made about the temperature of 212°, fusible metal was poured into the tube, passing along

FIG. 25.



the metal tube into the canal or cribriform tube and along its course, sending the metal out through its many openings into the cancellated tissue and the sockets of the removed teeth. The body of the bone and the lower portion of the ramus were placed in a ten per cent. solution of caustic potash. This dissolved the bone away, except particles seen as white spots which penetrate the metal through the cancellated tissue. A transverse section of this preparation would show fine bony tissue passing all the way through.

FIG. 26.

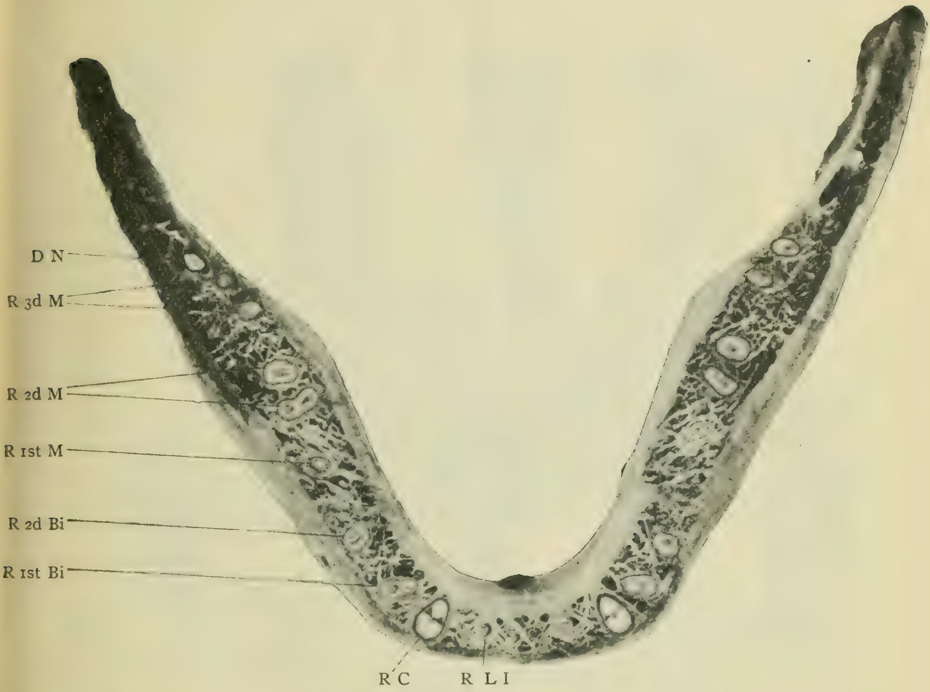


The upper picture represents the inner surface, showing the size of the canal or tube, and it might be said that it represents the space occupied by the nerves, blood-vessels, and their membranes. The lower picture shows the outer surface, and the projection seen is where the nerves and vessels pass out of the mental foramen.

Slide No. 26 is a horizontal section of the upper and lower jaws. It is made a little above the free margin of the alveolar process of the upper jaw and a little below that of the lower. It gives the shape and position of the various roots, with their relation to the process and to each other. Particular attention is drawn to the fact that there is so little space between the roots and the plates of the alveolar process that it would be impossible to force the beaks of forceps between the roots and process without breaking the latter on one or both sides. The lines in the cut represent the strongest axes of the teeth.

Slide No. 27 represents a section cut horizontally through the lower jaw, made near the end of the roots, from the same subject as the last slide. The cancellated portion, with the soft tissue filling the spaces, is well shown at the posterior part of the picture. The nerve is seen passing into its tube. The ends of the roots of the second and third molars, the tip of one of the roots of the first molar, the roots of the first and second bicuspids are plainly seen. A little of the lateral incisors will be noticed. The centrals do not go down so far.

FIG. 27.



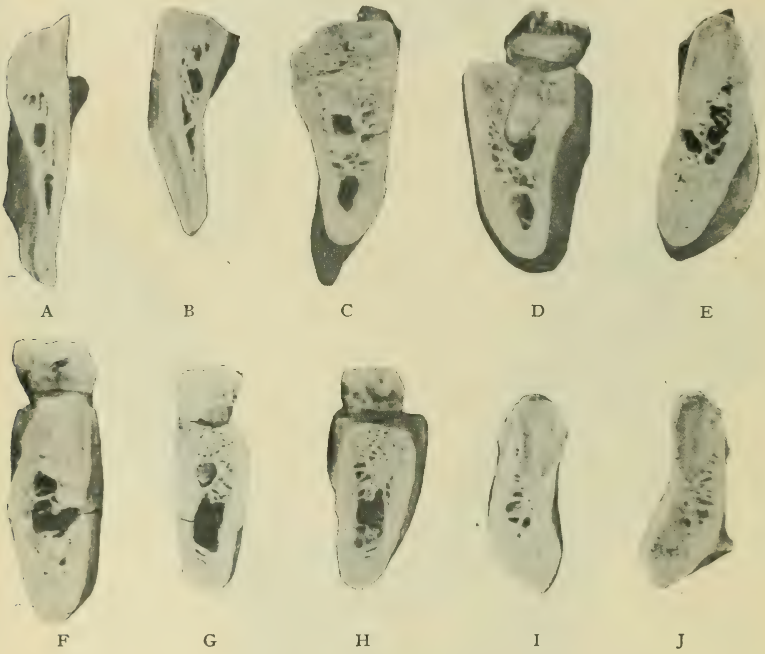
The illustrations we have been going over represent the lower jaw in the normal state. Those following will show various conditions of abnormality.

Slide No. 28 represents several sections of a lower jaw, not quite normal, there being evidences of past inflammation. Several teeth have been extracted before death, which changes the character of the jaw. Some of the sections show but one canal, while in other places there are many, and it takes close observation to tell in which the nerve and vessels have passed. In the operation of making a section or removing the whole nerve from the bone, a surgeon not familiar with this condition of things might easily clean out a portion of a canal, but not touch the nerve. This accident might not happen in a dried bone, but in the living the parts are so vascular, mistakes could easily be made.

At section D it will be seen that the root of the second molar penetrates the true nerve-canal. In the case of an abscess of this root, the discharge would flow into the nerve-canal; from this it could pass backward or forward along the nerve, and would give great pain by compression.

A baffling case of abscess on the external part of the lower jaw, just above the facial notch, can be explained, I think, by this specimen. The patient suffered great pain in the lower jaw. Finally a swelling made its appearance; the first molar was much diseased and was extracted, but this gave no relief. The swelling was lanced, from which a small quantity of pus was discharged, but this kept up for two months, when he came to the hospital and was treated in various ways without success.

FIG. 28.

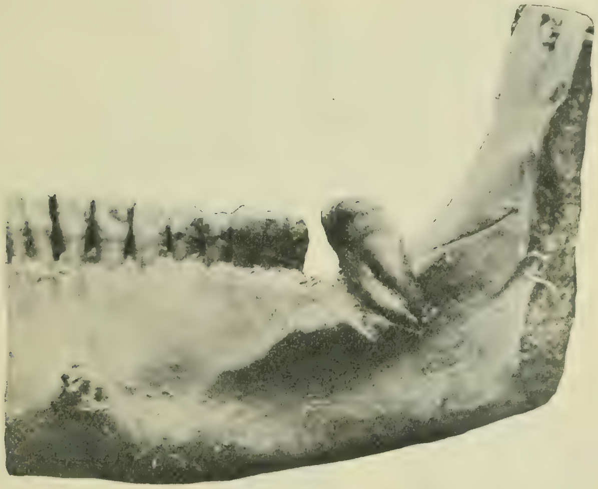


The teeth for a time were dismissed as being the cause, and cultivations were made from the discharge, to see if it were a tuberculous disease, but without results. The discharge was then examined by the microscope, to see if there were salivary corpuscles in it, but none were found. The second molar was in position and responded to heat and cold; finally a rubber-dam was placed over the second molar, and, gently approaching the pulp-chamber, it was ascertained that the nerve in the distal root was in a decomposed state, while the anterior branch was vital.

This was devitalized at once and the decayed matter removed from the distal root, after which carbolic acid was forced down into and through the root by the use of softened gutta-percha.

In a short time the carbolic acid made its appearance at the external opening on the jaw. The tooth was filled with gutta-percha and the patient dismissed. From 4 P.M. until the next morning carbolic acid worked out through the opening, when the parts closed and did not again open. The question was then asked, how could a bone fistula close so quickly, and why was there no discharge of broken-down tissue through the opening?

FIG. 29.



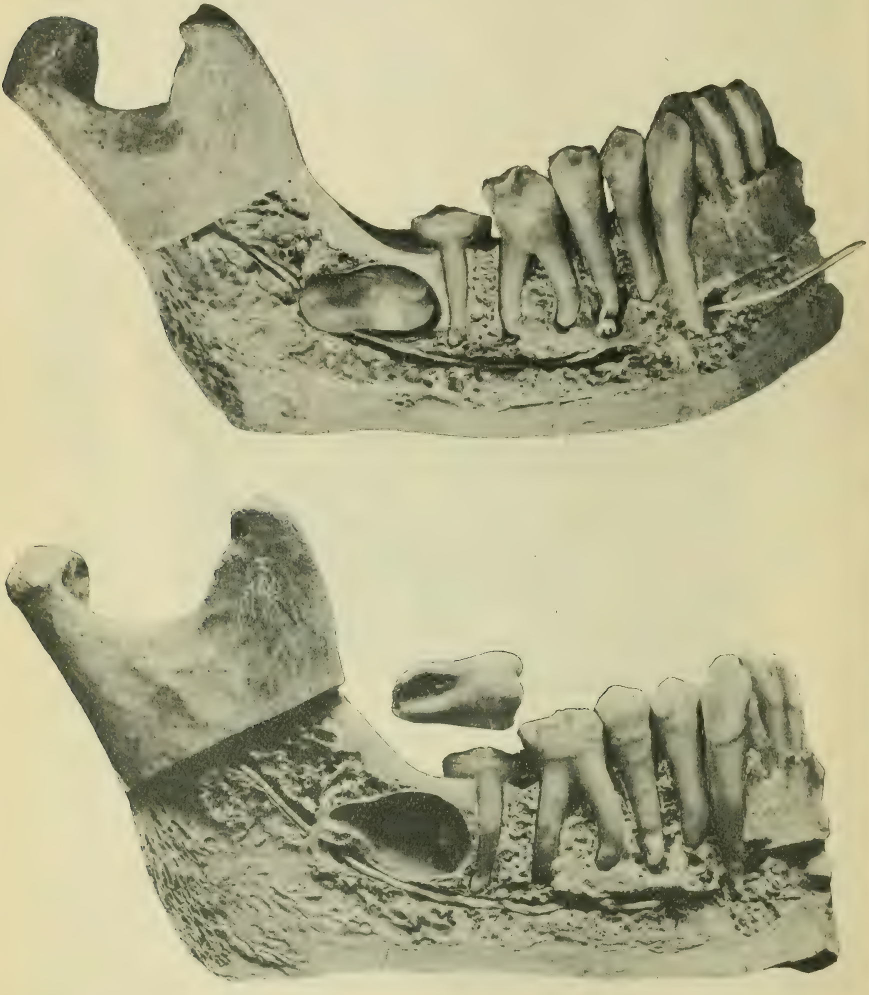
It can be explained by this section. If the discharge from the patient's tooth flows into the canal, like the one shown, it would have an easy passage along the canal, backward and out of the foramen, then down along the bone until it came in contact with the sheath of the internal pterygoid muscle, which could direct it into the submaxillary triangle and then pass out at its weak point, the opening for the facial artery. If such were the case, carbolic acid would clean this fistulous canal in such a manner that it would heal up at once.

Slide No. 29. Since making the preparation for the slide just passed, I have found a specimen where the roots of a third molar passed out through the inner wall of the lower jaw, a considerable distance below the mylo-hyoid ridge, as shown in the picture before you.

If this tooth had become diseased, it would have discharged its matter at once into the submaxillary triangle. I fully believe there are many unrecognized serious cases where teeth of this character, when devitalized, are causing pus to pass into the tissue of the neck, and even into the thoracic cavity. If diseased teeth in this region do not respond to treatment at once, they should be extracted. It is of much more importance than the saving of a tooth, as not only can ill health result, but death often occurs.

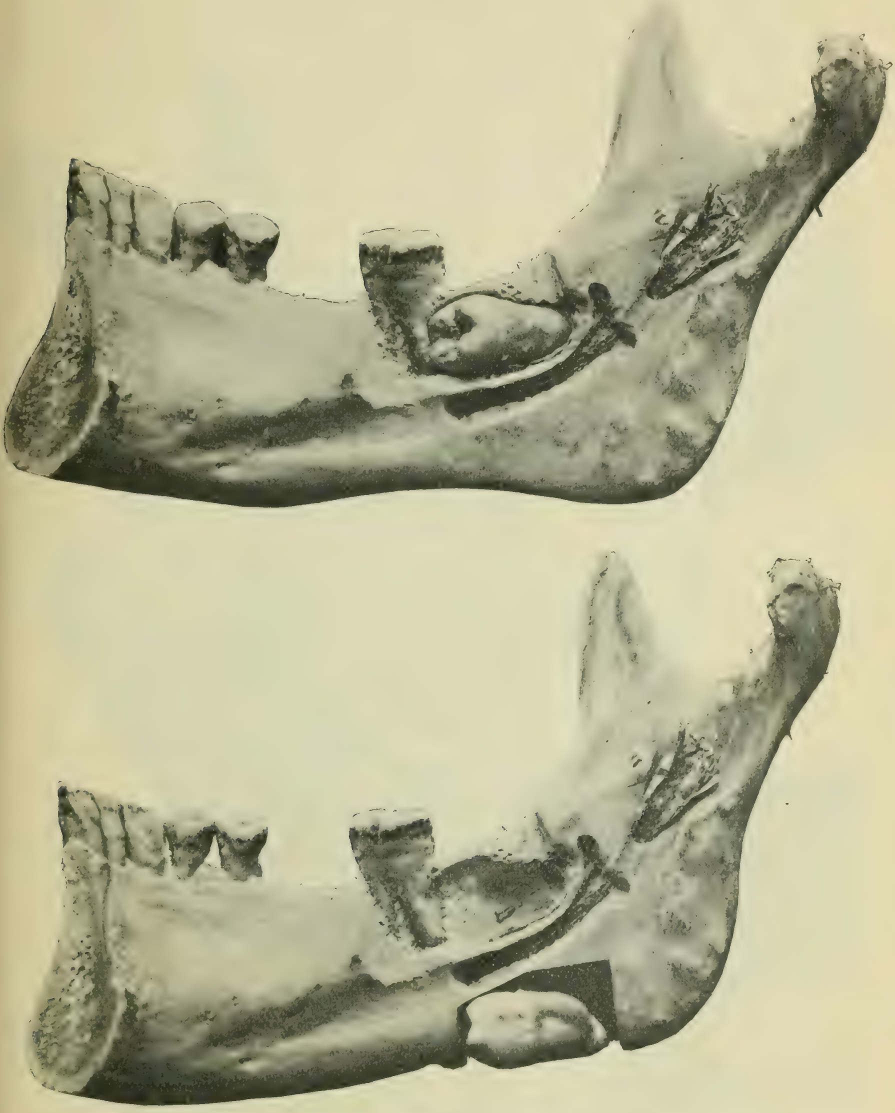
Slide No. 30 represents two views of an impacted third molar. In the upper one the tooth is in the position found when the cap of bone

FIG. 30.



was removed; the second view is where the tooth has been rolled out of its socket, showing its inner surface. The bed of the tooth is also shown. The second molar is a devitalized tooth, the distal root of which shows where the impacted tooth has pressed against it. Not only has it done this, but also caused absorption of a portion of the root until the pulp-canal within the root is fully exposed, and must have caused neuralgia in these parts. The roots of the impacted teeth have a slight curve inward at their points; the concavity fits immediately over the inferior dental nerve, and more than likely caused pain by pressure.

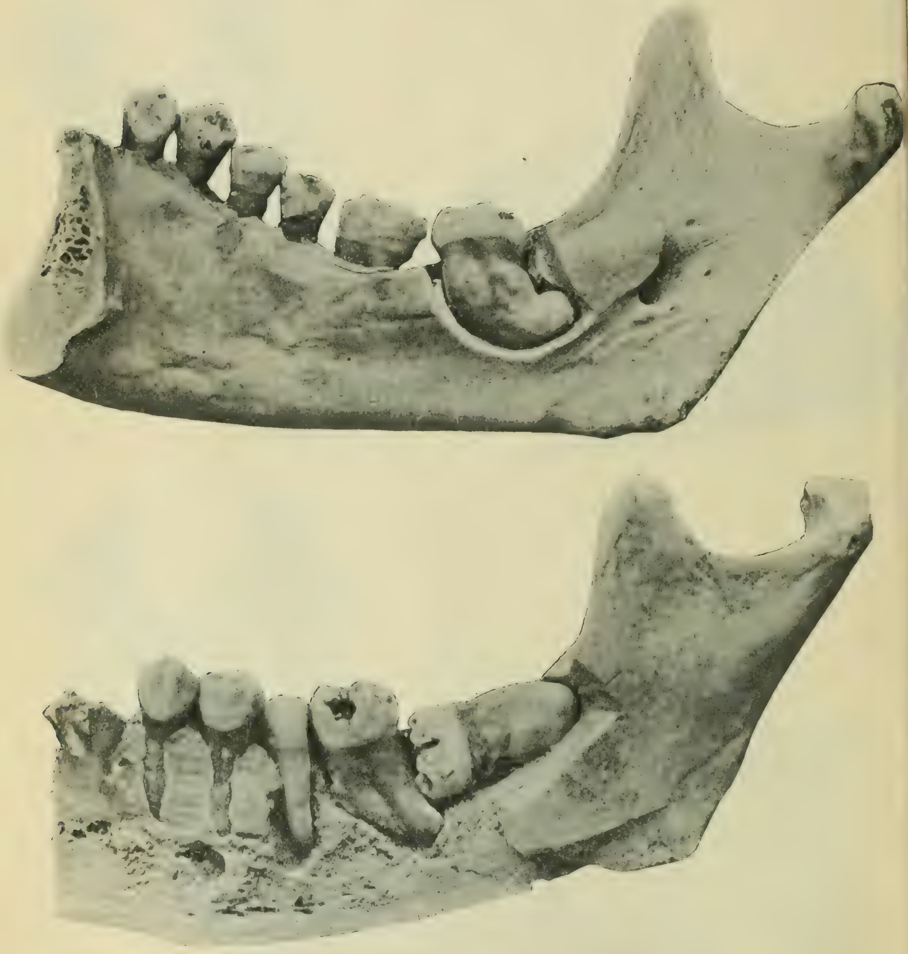
FIG. 31.



The ends of the roots are not fully formed, the apical openings being large. It will be noticed that the roots of the teeth in this jaw are longer than usual, the cuspid passing below the nerve and to its outer side.

Slide No. 31 represents another impacted third molar, situated on the inner side of the jaw, and pointing slightly downward. The distal root of the second molar is slightly absorbed. On uncovering the tooth and taking it from its bed, it was found to be incased in a thin shell of bone as though the dentinal sac had ossified separately around the tooth. The inner portion of this shell is still in position; the nerve and its accompanying tissue is seen passing into the inferior dental foramen immediately against the shell, and has the appearance of being flattened out; it divides and sends a branch around the internal half of the shell. Here again must have been an obscure cause of neuralgia.

FIG. 32.

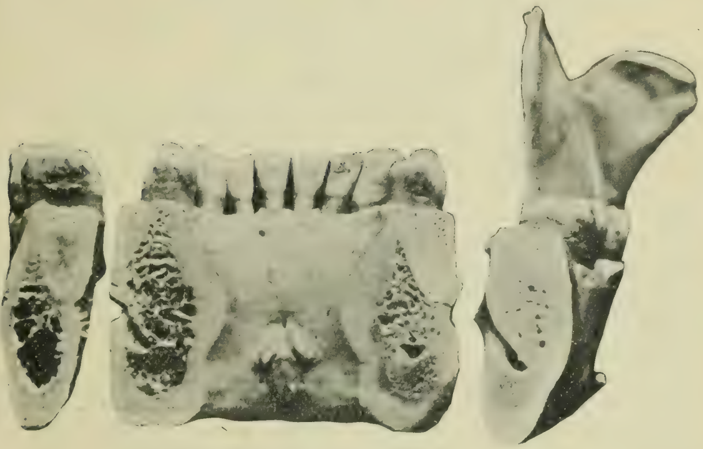


Slide No. 32 is made from the left and right halves of a lower jaw, one showing the internal surface of the right half, while the other shows the external surface of the left. In that of the right we find the roots of the third molar curved backward. It is also enlarged by an abnormal deposit of cementum until the independent character of each root is lost. This, I think, has been caused by the vascular excitement localized in these parts.

Not only have the roots become enlarged, but the surrounding bone has become much thickened, and the cancellated tissue of the jaw has lost its fine structure and become more solid.

It would have been impossible to have extracted this tooth without breaking quite a large piece from the inner side of the jaw. A fracture at this point often produces serious results; the mylo-hyoid artery is liable to be lacerated, or even broken, and the hemorrhage is difficult to control. The consequent inflammation will often cause the lack of free movement of the jaw. It also interferes with deglutition, speech, etc., and even the glottis may become closed.

FIG. 33.



The left half of this jaw shows an impacted tooth pushing directly against the tooth in front of it. The roots of this tooth have become much enlarged by deposit of cementum. The surrounded bone is also thickened and more compact.

Slide No. 33 is taken from a section made transversely through the lower jaw at the mental foramen of each side. On the right side the cortical U-shaped portion of the bone and the cancellated tissue is in about a normal condition, while that of the left side, the cortical U-shaped portion, and the cancellated tissue have changed. The former has thickened and become more dense, while the latter has become filled with secondary bone deposit. The only reason that can be given for this difference is that all the teeth on the right side were in good condition, while on the left side the first molar had been much diseased, causing an inflammation of that side of the jaw, the vascular excitement having caused the activity of the osteoblasts of this region to build this bone.

PROSTHETIC DENTISTRY: THE GLENOID FOSSA; THE MOVEMENTS OF THE MANDIBLE; THE CUSPS OF THE TEETH.

BY W. E. WALKER, D.D.S., PASS CHRISTIAN, MISS.

(Read before the Southern Dental Association, November 5, 1895.)

As volumes might be written on the subjects I have named in the title of my paper, I will say at the outset that I have endeavored to eliminate as much as possible of what is to be found in standard authorities,—text-books and journals, general and special,—going over familiar ground only in so far as is necessary to make clear certain observations of my own on a few points which, it appears to me, have not received sufficient attention.

Taking for granted then your familiarity with the temporo-mandibular* articulation as described in the text-books, I will first say that I have not been able to find mention of the fact that that portion of the roof of the glenoid fossa which affords articulation to the condyle of the mandible has a forward and downward slant or incline, and that consequently the condyle moves not only forward but also downward, causing the ramus to drop in the anterior and lateral excursions of the mandible.

As the authorities are quite unanimous in describing the movements of the mandible, I will not detain you with quotations, but will merely say that it is invariably stated that, to produce the anterior and lateral movement, the condyles "move forward." The movement is really *downward as well as forward*, due to the incline in the roof of the glenoid fossa which I have mentioned.

In the lateral movement of the mandible, we are taught that the condyle on the side *toward* which the jaw is advancing remains stationary, except that it rotates on its axis.† This statement is not quite exact, as this condyle moves, though very slightly, both upward and backward.

We are also taught that the condyle on the opposite side—that is, the side from which the jaw is receding—comes forward. In reality it travels downward as well as forward on an incline; the course which the condyle travels being at an angle ranging from 25° to 45° to the line or plane of occlusion,‡ being from 30° to 50° to the facial line, while the average dento-occlusal facial angle being about 75°, gives an average of 15° for the angle formed by the dento-occlusal and the horizontal plane when the facial line is placed vertically.

Figs. 1 and 2 will serve to make clearer what I mean.

---

* Gould's Dictionary of Medicine, 1895.

† The only exception to this statement that I have found is the following, from Holden's Human Osteology, p. 88: "In masticating, we can readily feel that one condyle advances toward the anterior margin of its glenoid cavity, while the other recedes to the posterior." Bonwill says " . . . It stands still, or does not move backward; it merely revolves or rotates in the socket, which is but a trifle."—*Harris's "Principles and Practice," twelfth edition.*

‡ I differentiate between the line or plane of occlusion and the line or plane of articulation, the former being a straight line tangent to the morsal surface of the inferior central incisors and the distal-buccal cusp of the inferior second molars, while the latter is a line tangent to the morsal surface of the superior central incisors and the distal-buccal cusp of the superior second molars.

F D represents the facial line, that is a line touching the most prominent points of the median line of the face (excepting the nose), the brow and the upper lip being normally the most prominent points.*

In Fig. 1, the facial line F D being vertical and H D perpendicular to it and therefore horizontal, the line O D will represent the average line of direction of the plane or line of occlusion (not articulation), and the line C D the line of direction traveled by the condyle; the average angles being $\overset{15^\circ}{HDO}+\overset{35^\circ}{ODC}+\overset{40^\circ}{CDF}=\overset{90^\circ}{HDF}$, the right angle formed by the vertical facial line and the horizontal line.

FIG. 1.

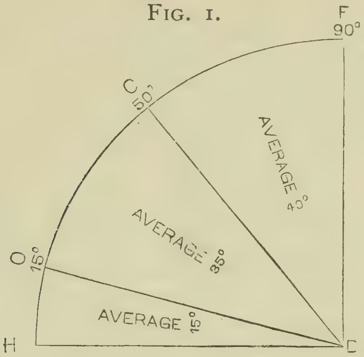


FIG. 2.

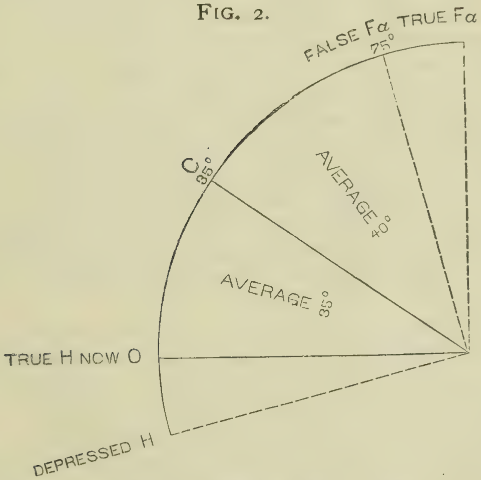


Fig. 2 shows the horizontal line depressed in order to make the line of occlusion horizontal for convenience in mounting our models in the articulator, the angles however remaining the same.

When the mouth is opened the downward (as well as forward) excursion of the condyle causes the *ramus* to descend about three millimeters (or about one-eighth inch.)

---

* The facial line here given is the only one we can use in our dealings with the living subject, as the facial line of the osteologist requires the exposure of the lower margin of the superior alveolar border, which is impracticable in practice. Therefore in measuring the naked skull we must allow for the thickness of the soft tissues, before comparing with the measurements of the living subject.

When the morsal surfaces of the incisors are brought in contact the drop at the condyle is about the same; for though the jaw is not opened so much, still the forward excursion of the mandible has caused the condyle to travel both *down* and forward.

In studying the movement of the condyle in the opening of the mouth there is found a point at the back of the ramus, about fifteen millimeters (five-eighths of an inch) below the upper surfaces of the condyle, which neither moves backward nor forward, but all of the mandible below this point falls backward in opening the mouth, and all above it, including the condyle, moves forward; the jaw does not swing directly from the upper surface of the condyle, but moves as though it were pivoted in a slot, with the imaginary pivot about fifteen millimeters below the upper surface.

Variations from the averages given are due to the variable overlap and overbite of the incisors, and also to the slight difference in the incline of the roof of the glenoid fossa in different subjects.

The condylarthrodial* articulation in a socket having a forward and downward inclination of the roof gives the mandible a peculiar back-and-forward rocking motion during its antero-posterior excursion, while in swinging from one lateral position back to the center, and over to the other side, it causes the mandible to rock from side to side about four millimeters (about three-sixteenths of an inch), as though see-sawing on its antero-posterior axis.

These statements (which, however, I have not been able to find in the books) may be proved in two ways:

One is to place, *in a properly constructed articulator*, models of a normally articulated set of natural teeth, and move the lower jaw of the articulator so that the cusps of the teeth will take the various positions that they can be given in the mouth,—not only during occlusion, but also in the "grinding" and in the "biting" articulation, when it will be found that *with an articulator permitting it* the part of the articulator representing the mandible will make the movements described above.

Another method is to select *a thin, accommodating subject*, without any superfluity of flesh on his jaws; the movements described can be plainly seen and felt, not only of the mandible as a whole, but of every portion,—especially the condyles and ramus,—which can be distinctly seen and felt to move as above described.

Studying the naked skull is interesting from an *anatomical* standpoint, but except by special preparation it is not possible to get the physiological motion, for the reason that the glenoid fossa is emptied of its intra-articular fibro-cartilage, its double synovial sacs, and its membranes, forming altogether a thickness of about two or three millimeters (one-eighth of an inch, more or less), which space will be found in the dried skull between the upper surface of the condyle and the roof of the glenoid fossa, so that when the condyle is thrown up in the socket the teeth fail to occlude.

---

* *Condylarthrosis*, "a form of diarthrosis wherein a condyle is set in a shallow and elliptic cavity, and free and varied movement of the joint is possible; condylar articulation." (*Gould's Dictionary, Medical, Biological and Allied Sciences, 1895.*)

Elaborate studies have been made along this line,—as by Drs. I. B. Davenport, of Paris, Hans Block, of Dresden, W. G. A. Bonwill, of Philadelphia, and others; but nowhere do I find mention of this inclination of the roof of the glenoid fossa, and the consequent peculiar features of the movements of the mandible, as herein described.

This movement of the condyles constitutes an important factor in many departments of our work in its bearings upon the articulation of the teeth, as in the study of the cusps of the natural teeth, with a view to bettering the articulation either in orthodontia or in the treatment of the disease commonly known as pyorrhea alveolaris; in the shaping of artificial cusps, whether in fillings, crown-work, bridge-work, or plate-work; in the treatment of diseases of the facial muscles, of plastic adhesions, and of the glenoid fossa, etc.

Dr. Bonwill's "Anatomical Articulator" has been quite generally accepted for many years as reproducing perfectly "all the movements of the human jaw." But in the use of this, as well as with other articulators, I so often met with failure in my attempts to give my patients something approaching normal facility in the "grinding" function *with artificial teeth* that I was led to study more carefully not only the articulation of the natural teeth, but also the movements of the jaw, and the articulation of the condyle in the glenoid fossa.

Following Dr. Bonwill's instructions, and articulating the cusps of artificial teeth as he directs, I nevertheless found that, while the occlusion and articulation would be perfect *in the articulator*, it was not so when the plates were put in the mouth. For while the *occlusion** would be similarly perfect in the mouth, the *articulation** was all wrong both for "biting" and for "grinding;" the cusps would interfere,—some too long and others too short. I could not obtain in the mouth the normal points of contact, in the forward and lateral positions of the jaw, with artificial teeth articulated in Dr. Bonwill's anatomical articulator, according to his instructions. I then began to study the articulation of the cusps of the natural teeth, both in the mouth and from casts placed in the Bonwill articulator, and found that I could not obtain all the normal points of contact with the casts in the articulator as with the teeth in the mouth from which the casts were taken, the principal difficulty being that in the lateral movements the lingual cusps of the upper molars would rest upon the buccal cusps of the lower molars on the side *from* which the jaw was receding, entirely preventing the teeth from touching on the side where mastication should be carried on, the space between the superior and inferior teeth on this side being three millimeters more or less. *Biting* was also prevented, the upper incisors being generally shorter than as represented by Dr. Bonwill, so that the upward turn of the posterior end of the interdental line—that is, the line of occlusion—would cause the second and third inferior molars to occlude with the first and second superior molars, holding the incisors entirely apart.

As you know, the angle in Dr. Bonwill's articulator which controls the representation of the movement of the condyle in the glenoid fossa forms a right angle to the portion representing the ramus, thus reproducing the *horizontally forward* movement of the condyle which we have been taught.

---

* I use the words *occlusion* and *articulation* as defined by Dr. Bonwill. (See reprint from Harris's "Principles and Practice," 12th edition.)

After much study and experimentation I found that to reproduce the correct articulation of the casts of natural teeth, in the various positions of the jaw, with all the normal points of contact of the cusps, it was necessary to increase this angle until, for the average jaw, it reached an increase of thirty-five degrees on a Bonwill articulator thus remodeled.*

Further experimenting showed that while this angle was adapted to reproduce a correct articulation with casts of a large number of as nearly normal dentures as we generally meet with, still there were some cases in which the normal points of contact could not be obtained without either increasing or decreasing the angle.

I therefore had a Bonwill articulator remodeled with *an adjustable angle*, with a gauge to register the degree of the angle at which the teeth on the models of different jaws articulated as in the mouth. This articulator I have called a "physiological" articulator, because it is physiologically (that is functionally) as well as anatomically correct throughout.

Experimenting with a large number of models from natural teeth, I have thus far found the extremes as registered on the gauge of my adjustable-angle articulator† to reach as high as 45 degrees in one case and as low as 22½ degrees in another,‡ 35 degrees representing the average angle of the slant of the roof of the glenoid fossa, as shown by the course traversed by the condyle. (See Figs. 1 and 2, page 35.)

Having discovered this hitherto unnoticed (or, at all events, *unrecorded*, as far as I have been able to learn) feature in the movements of the mandible, and having provided an articulator with which I could reproduce this feature, and thus secure perfect articulation and occlusion with casts of the natural teeth, my next study was to secure the same results with artificial teeth, for I found that artificial teeth, with the cusps articulated on Dr. Bonwill's articulator, by Dr. Bonwill's rules, when placed in my Physiological Articulator would, unless the angle was reduced to a right angle, fail to articulate exactly as they failed in the mouth, reproducing the same interference of the cusps that I have described as preventing both mastication and incising; occlusion, however, being perfect, both in the mouth and in my articulator, as in Dr. Bonwill's articulator.

Dr. Bonwill states the facts exactly when he says, "The inner cusps of the upper (teeth) should as a rule be longer or higher than the outer;" but, notwithstanding that he so clearly *states the fact*, yet, in his diagrams of the articulation of the molar cusps, in the lateral position, he represents the lingual and buccal cusps as being *of the same length*, the straight line L R of Dr. Bonwill's familiar illustration§ touching both the buccal and lingual cusps of all the teeth, J K M N on both sides of the mouth, both upper and lower. But while it is necessary to have the cusps of the same elevation in the Bonwill articulator, as shown in the illustration, they are never so found in the mouth except in rare abnormal cases. This illustration (Fig. 3) represents the molars J K in the masticating position, and M N in the "balancing position."

---

* The articulator thus remodeled I christened the "Walker-Bonwill Articulator."

† "Walker's Physiological Articulator."

‡ A case of extreme irregularity and therefore abnormal.

§ From Harris's Principles and Practice, twelfth edition, and reproduced in the chart accompanying the paper read by Dr. Bonwill at the World's Columbian Dental Congress, 1893 (see *Transactions*, page 232).

When the jaw of a Bonwill articulator carrying teeth so articulated is moved laterally to the grinding position, we admit that the teeth will take the position illustrated, with all the cusps on the same plane. But let a set of artificial teeth thus articulated be removed from the Bonwill articulator and placed *in the mouth*, the drop of the condyle on the side from which the mandible is receding influencing necessarily the ramus and the body of the mandible, and through them the plate and the cusps of the teeth, and it will be found that Fig. 4 will more nearly represent the condition we would have in the mouth, showing very clearly the result of following Dr. Bonwill's instructions for "shaping" the lower molars by reversing nature's plan and cutting down and rounding the buccal cusps of the lower molars. He tells us that to get the *lingual* cusps of the *lower* teeth "long enough for service . . . a large portion of the buccal cusps has to be cut down and rounded."* But, as before described, as the mandible advances the condyle drops, and no provision having been made for this feature of the condylar articulation, M and N, as shown in Fig. 4, fail to touch on either buccal or lingual cusps, and the plate *is not balanced*, while J and K touch only on the buccal cusps, the lingual cusp of the lower molar K being lowered in the rock of the mandible, but not provided for in the articulation (in Bonwill's articulator), and thus not only is mastication rendered impossible, but we have also the best possible arrangement for "tilting the plates."

FIG. 3.

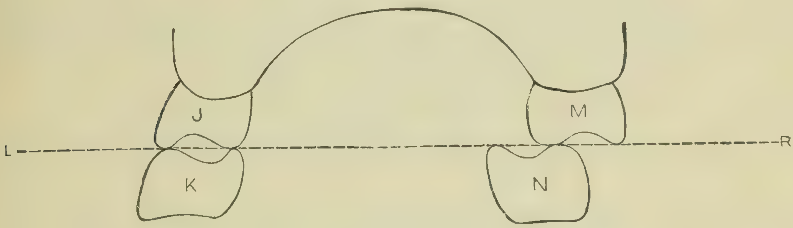


FIG. 4.

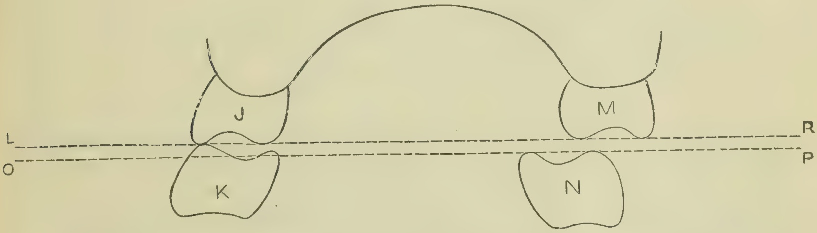


Fig. 5 represents the molars with normal cusps as articulated in Walker's Physiological Articulator, with the mandible thrown to the right for mastication as before, the line L R the plane of the short buccal cusps of the upper molars, J and M being the same as in Fig. 3, the *normally* longer lingual cusps of the upper molars J and M being on the lower plane O P. With the same drop of the left side of the mandible, the denture is nevertheless balanced by the *long buccal cusp* of the lower molar N meeting the long lingual cusp of the superior molar M on the plane O P.

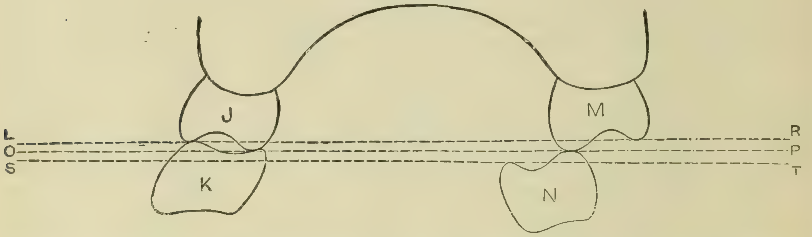
---

* Page 12, pamphlet reprint from Harris's "Principles and Practice," twelfth edition.

The masticating articulation on the right side is also perfect, the long lingual cusp of the superior molar J being met by the short lingual cusp of the inferior molar K on the lower plane O P, while the long buccal cusp of the lower molar K meets the short buccal cusp of the superior molar J on the higher plane L R.*

The difference in the planes occupied by the buccal and lingual cusps is greater in the mouth than would appear in looking at a tooth out of the mouth, held with its long axis vertical, as seen in many book illustrations. As placed *in the bones* in the mouth the inferior molars lean lingually, and the superior molars lean buccally, which has the effect of apparently increasing the distance between the planes occupied by the buccal and lingual cusps.

FIG. 5.



The prominence of the lingual over the buccal cusps in the superior teeth, and of the buccal over the lingual in the inferior teeth, becomes greater as we proceed toward the ramus, partly due to an actual increase in difference, and partly to the gradually increasing variation of the long axis of the tooth from the vertical, as we proceed toward the ramus.

In the superior molars not only do the buccal cusps become shorter as we pass back, but they become less in area also ; and of the two lingual cusps, the distal cusp—which in the first molar laps over the anterior third of the inferior second molar—becomes smaller in the second, lapping less on the inferior third molar ; while in the third molar, there being no fourth lower molar for the distal cusp to articulate with, it becomes merely rudimentary, and in very many cases is entirely wanting.

As the area of the buccal and of the distal-lingual cusps of the upper molars gradually decreases distally, conversely the mesial-lingual cusps become larger. This is not sufficiently so to prevent the entire tooth from becoming smaller, but the predominance of the mesial-lingual over the other cusps increases so considerably that in the third molar it is not an uncommon thing to find this cusp the only one on the superior third molar that comes in contact in the various movements of the jaw, and doing the entire work of the tooth, its long buccal slope coming in contact with the long lingual slope of the buccal cusp of the inferior molar, as the jaw is brought upward and inward in the act of mastication, while in occlusion it fits into the center of the deep sulcus of the third molar like a pestle in a mortar.

---

* In the large chart used when reading the paper, the molars in Figs. 3, 4, 5, are represented in colors, superimposed one upon the other, but for convenience of reproduction in black they are here represented separately, the positions of the cusps upon the planes in the Figs. 3, 4, 5 being the same as in the superimposed molars in colors of the chart. The verbal remarks explaining the chart diagrams are also here inserted in the text, in connection with the figures.

While a third molar is not desirable in artificial dentures, there are many cases in which we could obtain better results by grinding and arranging second molars to represent the third molars of the natural teeth ; as, for instance, in those cases where there is a very narrow alveolar arch at the rear, with a wide tongue, we can accommodate the tongue by setting the second molar a little outside of the ridge, not allowing the buccal cusps to articulate. The lingual cusp would do the entire work (as is often the case with the natural third molar). By this means we would lessen the liability of tilting the plate.

Practically I find in arranging artificial teeth, that if the overlap of the incisors is made as great as the normal, in order to have the molars balance the incisors and *support the plate* in incising, it is necessary to considerably increase the curve of the distal end of the interdental line.

I find, therefore, that it is more practicable to slightly decrease the overlap by shortening both upper and lower incisors a little, and therefore necessitate but slightly increasing the curve above the normal. It is exceedingly rare that we find a case in which the cusps of the molars touch at the same time that the morsal surfaces of the incisors are in contact, when the mandible is brought forward for the purpose of biting or incising with the natural teeth.

In studying the cusps of the teeth, it is advisable not only to examine them *in the mouth* but to take models from them for studies in articulation. A convenient method will be found in placing the models, with *the cusps downward*, on a clear slab of glass, when, after considering them as a whole, the different pairs can be studied more closely by bringing the pair under study to the edge of the glass, when the comparative height of the cusps can be clearly seen ; the curve of the interdental line not permitting this to be seen so well while the entire model rests on the glass.

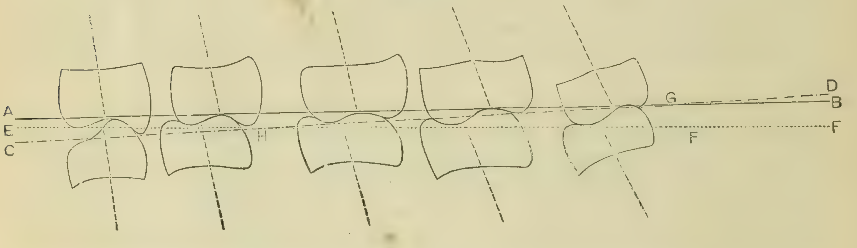
Considering the most prominent points of the morsal surfaces of the superior teeth, we find the labial and buccal points of the teeth anterior to the second bicuspid to occupy a plane which slants upward and backward, while in the molars the plane curves up more rapidly. This has in substance been said before ; but if we look farther and consider the two rows of cusps of the teeth of one side of the maxilla, we will find a condition which I have not found mentioned, as follows : the line formed by the plane of the elevation of the lingual cusps, as viewed from the side, when it starts at the first superior bicuspid, is more elevated than the plane of the buccal cusps, but it crosses the plane of the buccal cusps usually between the second bicuspid and the first molar, the two lines continuing to diverge as they pass distally, though both are inclined upward as viewed from the side.

In Fig. 6, A G represents a side view of the plane of the sulci of the upper bicuspids and molars; C G, the plane of the buccal cusps; and E F, the plane of the lingual cusps, E F intersecting C G at the point H between the second bicuspid and first molar. (This is, of course, diagrammatic, the straight lines here shown following in the mouth the curve of the interdental line of occlusion, the relative proportions, however, being the same.)

In this illustration we see the superior buccal cusps gradually becoming shorter as we proceed distally until when we reach the point G where the lines intersect, and where a fourth molar, if there were such teeth, would be located, the buccal cusp would be on a horizontal plane with the sulcus, or merely rudimentary as sometimes seen in the third molar.

Conversely the superior lingual cusps grow longer as we proceed distally, so that if the lines A B and C D, which intersect at G, were continued to a point beneath a line connecting the two condyles, if we could conceive of a tooth at that point, a line from the sulcus to what would represent the position of a buccal cusp would slant up toward the cheek instead of down toward it as anterior to the crossing of the lines at G, while the imaginary tooth would have a very long lingual cusp.

Fig. 6.



A series of lines drawn linguo-buccally across the summits of the cusps of the superior teeth would be found in the first bicuspid to slant up toward the roof of the mouth, while on the second bicuspid it would be about level; on the three molars it would slant more and more toward the floor of the mouth as we proceed distally.

This arrangement causes the upward curve of the summit of the cusps, as we proceed distally, to be much more marked in the buccal than in the lingual cusps.

The lingual cusps of the superior teeth thus increasing gradually in height from the bicuspid to the third molar, interference of the cusps in the lateral movements of the mandible would be inevitable, were it not for the drop of the posterior portion of the jaw, due to the condyle gliding over the downward slant of the roof of the glenoid fossa which I have described.

The reproduction of this motion of the mandible in order to allow the lingual and buccal cusps of our artificial teeth about the same proportionate length as in the natural teeth (this being essential to the grinding motion in the function of mastication, whether with natural or with artificial teeth) necessitates an articulator which provides for the slant in the roof of the glenoid fossa and the drop of the posterior portion of the jaw.

Also, as the angle of the slant or incline is not the same in all subjects, varying in extreme cases from 30 degrees to 45 degrees within the limits of the normal, as I have said, it is necessary that the articulator be provided with a variable angle.

In conclusion, I quote from Dr. Bonwill: "The query here naturally arises to those who have never looked into the philosophy of this matter, whether these peculiarities are necessary, and if it is possible to utilize them in our artificial dentures; and, if so, how can it be done by any of the articulators now in the market, or can it be done at all by any human device? To all these inquiries I answer in the affirmative."*

In my clinic, as announced in the program, you will see such an articulator, and it is one which, I believe, will demonstrate to you the movements herein described and the correctness of the statements which I have made.

THE EFFECT OF OXIDATION ON CUT ALLOYS FOR DENTAL AMALGAMS.

BY G. V. BLACK, M.D., D.D.S., SC.D., JACKSONVILLE, ILL.

At the ending of my paper on silver-tin amalgams in the August number of the Cosmos, 1895, I made the statement that several examinations contemplated had not been made for lack of time. Among these was mentioned the *ageing of alloys*. At the time I did not know whether or not I should be able to take up the subject again. But after the series of articles were completed and I had studied the results more leisurely, and again reviewed my notes of experimental work, I was more than ever impressed with the idea that there was some influence operative in causing shrinkage and in increasing the percentage of flow that I had failed to discover. Certain formulæ had behaved badly both in flow and in shrinkage, which, from their composition, should have given better results. Also, in many cases the shrinkage was unaccountably erratic. This impressed me so strongly that after a few weeks' rest I took up the study of *ageing* of the cut alloys, to see what its effects might be upon the mass. It has long been known that the cut alloy changes somewhat in its working properties as it becomes older. It comes to set slower, and loses that crisp brittleness coming on almost immediately after wringing out the excess of mercury. In a word, the mass becomes mellow and works softer, is more pliant. This has generally been regarded as desirable. Indeed, J. Foster Flagg states that "no amalgam is fit for use until it has been cut at least two months,"† and enumerates the advantages accruing from ageing.

This *ageing* is nothing more nor less than a slight oxidation of the cut alloy brought about slowly at ordinary temperature by more or less contact with the air, and I shall drop the term *ageing* and use the better term *oxidation*.

---

* Pamphlet reprint from Harris's "Principles and Practice," twelfth edition, page 6.

† Plastics and Plastic Filling, page 65.

I know of no hint in the literature that oxidation of the cut alloy caused it to shrink. Indeed, so desirable has the effect of slight oxidation of the cut alloy been regarded that many manufacturers have sought and found means of producing it immediately in any degree desired. Any means that will rapidly induce such a degree of oxidation as will occur normally at common temperatures within two to four months produces like results. It may be done by subjecting the cut alloy to boiling water for a few moments, or, for a greater effect, from ten to fifteen minutes, and then drying at room temperature. Or it may be brought about by exposing the cut alloy to certain elevations of temperature dry. It may be done by shaking for some time a comparatively small portion of the cut alloy in a large glass jar, so that the air contained is repeatedly brought in intimate association with its particles. It may be done by running the machinery for cutting so rapidly as to develop considerable heat. Indeed, any means that will induce comparatively rapid oxidation will produce this result.

In order to study the subject completely I erected machinery for cutting alloys in the several favorite forms for use, and asked a number of manufacturers to make for me ingots of certain formulæ. While these preparations were in progress, a number of manufacturers sent me new formulæ for tests of their qualities. Among these were several of the same formula. In testing these for shrinkage and expansion, I found they were not at all alike. The reputation of the makers eliminated all idea of any intended deception, and convinced me that something had happened to the material. Very soon I had ingots of this alloy from several makers. It was cut with the utmost precautions as to the development of heat, and test fillings made from one to six hours after cutting. Treated in this way I found the alloy from the several makers substantially alike.

Now taking the formula, silver 65, tin 35 per cent., which I had found in previous experiments to neither shrink nor expand, and cutting it with precautions as to the development of heat, it was found upon test to expand from one to three ten-thousandths of an inch. Within two or three days after cutting there was neither shrinkage nor expansion. A trial eleven days after cutting, the alloy having been kept in a well-corked (common cork) bottle, but opened once per day and turned up as in taking material for use, gave three ten-thousandths of an inch shrinkage. In the mean time the fresh-cut alloy was oxidized artificially. The alloy was shaken together after cutting, and one half placed in a test tube and distilled water poured over it. The tube was then placed in a vessel of boiling water for ten minutes, after which its contents were thrown on the filter to drain off the water, and the alloy spread to dry at room temperature. Of the remaining half, part was used at once for test fillings, and part retained in a tightly-corked bottle to be used at the same sitting in comparison with the oxidized alloy. In the comparative tests the fresh alloy (unoxidized) did not shrink, but the oxidized alloy shrunk *nine ten-thousandths of an inch at each test.* These tests were repeated a number of times without variation in the results.

Then another sample of the fresh-cut alloy was shaken together so that the different portions of the ingot should be well mixed, and one half placed in a dry eight-ounce glass flask, the neck of which was packed with dry absorbent cotton, and a piece of rubber-dam tied securely over it to prevent the entrance of moisture. This was placed in a vessel on boiling water, and the body of the flask covered over with several thicknesses of cotton cloth so that it should be enveloped in live steam. It was allowed to remain in this position for thirty minutes, except that it was lifted and well shaken every five minutes. The results of tests with this were found to be the same as with that oxidized wet. The alloy not oxidized made an amalgam that did not shrink, but the amalgam made from the oxidized alloy shrunk nine ten-thousandths at every test. These tests were repeated a number of times with similar results. A shorter time given to the oxidation produced less shrinkage. Exposing the alloy spread upon an iron plate to a higher temperature, that which gave a slight tinge of brown to white paper, produced a condition in which the alloy did not set for about sixteen hours, and forty-eight hours afterward I could crumble the mass between my thumb and finger. The shrinkage of this was six ten-thousandths of an inch.

A portion of an ingot of the alloy was annealed, and after it was fully cold, cuttings were made from it and test fillings made to see if heating had any influence upon the behavior of the metal. This took a little more mercury than the alloy unannealed, and expansion occurred a little quicker, but it was not greater. There was no shrinkage. Therefore, the conclusion seems inevitable that oxidation of the cut alloy is a direct cause of shrinkage.

Now here was shrinkage from oxidation that covered all but a few of the worst tests which I had published in the COSMOS in August last, and at once it became a question as to whether or not I had been entirely wrong in the conclusions drawn as to the value of the various formulæ. Indeed, it furnished strong reasons for the supposition that the shrinkage I had found was from oxidation, and did not necessarily appertain to the formulæ. I had not inquired as to the *ageing* of alloys by this or that manufacturer, nor as to the length of time they had been cut. With this shadow upon my published records and conclusions, I lost no time in studying other formulæ containing less silver and more tin, varying in grade down to forty-four per cent. of silver. These alloys were made especially for these tests by Dr. P. J. Kester, The S. S. White Dental Mfg. Co., and Dearborn Refining Co., as an assistance to me in the prosecution of this work, and other manufacturers are making alloys for its further prosecution. I have now studied nine formulæ, freshly cut and oxidized artificially in varying degrees. In every case the effect of oxidation has been practically the same, and in proportion apparently to the extent of the oxidation. If the alloy used fresh shrunk, that which was oxidized shrunk more.

In following out this study thus far with the artificially oxidized alloys in comparison with the fresh-cut alloys, I have been fully reassured as to the conclusions I had drawn from previous work. All formulæ containing less than sixty per cent. of silver have shown contraction, both when measured by the special micrometer and by the opening of the margins as seen with a half-inch objective. But in every formula in which I have had the opportunity of comparing, the shrinkage has been very much less with the freshly-cut alloy than it was with the alloy used last summer. The greatest shrinkage found in fresh-cut alloys thus far is five ten-thousandths of an inch, in the alloy containing but forty-four per cent. of silver. The shrinkage gradually disappears as the silver is increased to sixty or sixty-five per cent., the exact dividing line appearing to be between these two.

Several of the alloys studied have had mixtures of other metals. From the study of these, which has been very limited, it would appear that the conclusions drawn in my papers last summer as to the effect of the addition of other metals to the silver-tin alloys are but partially sustained. Indeed, from what study I have been able to give this point, it would appear that good non-shrinking alloys containing other metals, as gold, zinc, etc., may be made, though some changes in formulæ will be required.

In this series of studies great care has been taken in noting the working qualities of the amalgams, the amount of mercury required by the alloys, fresh or oxidized, and every other peculiarity noticed that could be expected to be of value, all of which have been made a matter of record at the time the filling was made.

The oxidation of the cut alloy produces marked changes in the working qualities of the mass, which are best appreciated when the fresh and the oxidized material are mixed and used at the same sitting. The profession seems to have been captivated by alloys that work smoothly and softly without setting too quickly, and manufacturers have so tempered their alloys as to meet the demand, neither party knowing that the resulting amalgam was caused to shrink. Freshly-cut alloys do not make smooth and soft-working masses, but, on the other hand, they are crisp and harsh, and set quickly. This is especially true if the alloy contains a sufficient percentage of silver to prevent shrinkage, or if small quantities of other metals are added to the silver and tin. From all that I have thus far seen it appears that we must give up soft, smooth-working alloys if we are to have amalgams that do not shrink.

Oxidation of the cut alloy produces marked changes in the percentage of mercury required to make a good working mass. Careful trial has shown that if an alloy be mixed with an excess of mercury and kneaded into a pliant mass, and then wrung out in a certain way, always as nearly as possible with the same force, a certain percentage of mercury will be retained; and that different formulæ will differ in the percentage of mercury retained against the wringing. In applying this test there must be a sufficient excess of mercury to make the mass fairly pliant, and it must be wrung out before setting begins. If there is too little mercury in the mix, an *excess* will be retained. Mixing considerably more than the required amount of mercury does not affect the result. By working in this way and gaining experience in the manipulation, it is found that a freshly-cut alloy holds a certain per cent. of mercury against the wringing process, and that each formula holds a different amount. If, however, the cut alloy is oxidized, either naturally or artificially, there is a marked change in the percentage of mercury retained. For instance, the alloy silver 65, tin 35 per cent. held against the wringing process fifty-one to fifty-two per cent. of mercury when used within one to six hours after cutting, and gave an expansion of two, and three, ten-thousandths of an inch. The same alloy kept in a tightly-corked bottle, but opened daily, the alloy being turned up as in taking material for use, for eleven days held then forty-three per cent. of mercury, and the amalgam *shrunk* three ten-thousandths of an inch. The same alloy again, when oxidized by exposure to boiling water for ten minutes, held thirty-five to thirty-seven per cent. of mercury, and shrunk nine ten-thousandths of an inch. Similar results have been noted with each of the alloys studied.

Again, in packing the freshly-cut alloys after thorough wringing out, little or no free mercury is brought to the surface. The softening under the instrument is but little more than sufficient for good cohesion, and no free mercury can be expressed with the rubber point. On the other hand, the oxidized alloys, wrung with the same force and containing a much smaller percentage of mercury, soften greatly under the instrument in packing, and yield a considerable amount of free mercury to the pressure of the rubber point.

Retaining more mercury in the mass, or forcing the mass to extreme dryness by any effort that would be compatible with filling-operations, does not seem to affect the shrinkage in marked degree. If, however, the mass is forced so dry as to work *dead hard*, or is fairly set before packing, the shrinkage will be modified or partially prevented. Mercury is not the element that causes the shrinkage of amalgams.

In freshly-cut alloys the *expansion curve* is more marked, and comes on sooner than in oxidized or slightly oxidized alloys. With the alloy (silver 65, tin 35), used immediately after cutting, expansion begins within six hours, running to two or three ten-thousandths of an inch. Twenty-four to forty-eight hours later, the alloy having been kept in a stoppered bottle, this expansion disappears almost entirely. A silver 60, tin 40 alloy usually showed a very slight contraction within the first three hours, rarely passing one ten-thousandth of an inch, the margins as seen with a half-inch lens remaining perfect. Within the next twelve hours an expansion of two (one above the starting-point) ten-thousandths occurred. Silver 55, tin 45, gave pretty regularly two ten-thousandths of an inch shrinkage, the margins opening so as to be plainly visible with a half-inch lens, and expanded about the same within the next twelve hours. This expansion does not close the margins opened by the shrinkage. With whatever alloy, so far as I have seen, an expansion following a shrinkage that has opened the margins fails to mend the breaks. It is evident that the contraction is mostly in the upper half of the filling, while the expansion is mostly in the lower half. An expansion of less than five ten-thousandths of an inch rarely disturbs the margins of a filling, the rise being in its center, and is probably no injury whatever. But a contraction of two ten-thousandths of an inch opens the margins visibly (with the microscope), and undoubtedly will cause the filling to leak.

Washing processes, with the view of restoring the alloy by removing the oxid, have as yet been but partially tried. The usual methods of washing with ether or alcohol proved to be of no value, though apparently much oxid was removed.

This covers in brief the main features developed since the publication of the articles on amalgams in the July and August numbers of the Cosmos. The studies are yet far from complete, and the nature of my engagements is such that the work must be suspended until the spring or early summer. I thought, therefore, that this brief report ought to be made now, leaving a more detailed report to follow when more complete data have been obtained. Preparations for further work have been in progress. Cut alloys have been laid aside to test plans of keeping them in good condition,—in bottles with common corks, in sealed bottles, and in hermetically sealed glass tubes. It is evident, from the results of these tests, that changes must be made in the commercial handling of this material.

GUAIACOL-COCAIN CATAPHORESIS AND LOCAL ANESTHESIA; A NEW CATAPHORIC ELECTRODE AND THE WHEELER FRACTIONAL VOLT SELECTOR.

BY WILLIAM JAMES MORTON, M.D., NEW YORK, N. Y.

In a recent address before the First District Dental Society of New York City the writer described a method of producing local anesthesia more rapidly and more profoundly than by any means before known to him. This was by the use of guaiacol as a solvent for hydrochlorate of cocain, and caused to penetrate tissue by aid of the electric current, upon the principle of electro-physics commonly termed cataphoresis. Electro-guaiacol-cocain anesthesia requires two-thirds less time and two-thirds less current than aqueous solutions of cocain used by the cataphoric method. The anesthesia produced is due both to guaiacol (in itself capable of producing local anesthesia) and to cocain, and is far more profound than cocain anesthesia alone.

The formula for the mixture is :

℞—Guaiacol, ʒ i ;
Cocain hydrochlorat., gr. v. M.

These quantities constitute a solution containing eight per cent. of cocain ; solutions containing thirty-two per cent. can, if desired, be made.

Having already experimented with this new preparation on the skin and mucous membrane, I next employed it in producing anesthesia of sensitive dentine, and with perfect success, as evidenced by the following two cases reported at the meeting above referred to.

Patient, Miss M. W., age eighteen, brought to my office by Dr. M. L. Rhein, and operations on the teeth by him.

Patient of extremest hyperesthetic state.

Experiment 1.—Deep crown cavity in second superior right molar, almost to the horns of the pulp of the buccal root. Very sensitive, especially as it approached the horn of the pulp.

Electro-guaiacol-cocain anesthesia, seven minutes in two applications. Result, perfect anesthesia to hand excavation. Patient experienced no pain from the current.

Experiment 2.—First right superior bicuspid, posterior approximal and crown cavity. Had been attempted to prepare the tooth at a previous sitting, but on account of the extreme sensitiveness, work had been abandoned before the cavity had been entirely excavated; the bottom of the cavity was covered with asbestos paper, over which was packed a filling of gutta-percha.

On removal of the filling, after having been in place about six weeks, the tooth was found exquisitely sensitive to the slightest touch.

Electro-guaiacol-cocain anesthesia. The first approaches of the current (not noted on the milliamperemeter) gave severe pain, which gradually subsided, and each subsequent increase of current caused pain. Three applications on cotton were made. After seven minutes of about one-tenth of one milliampere, I was able to carry the current up to two-thirds of a milliampere without pain.

Complete anesthesia.

On exploration, it was found that after the removal of a thin film of leathery dentine, the point of an excavator readily entered into the pulp-chamber without any consciousness of pain on the part of the patient. Completely successful.

No hyperesthesia of the tooth the next day.

At the same meeting I gave, as a result of experiments, a second formula of guaiacol alone with one minim of sulfuric acid and one minim of water. The formula reads:

℞—Guaiacol, ʒi;
Acidi sulfurici,
Aquæ, āā ♏i.
Sig.—Shake into an emulsion.

This also may be used to produce local anesthesia cataphorically, but its application causes slightly more pain initially, and to obviate this initial pain a very small amount of cocain may be added if desired. Since guaiacol is a non-conductor of current, this minute amount of sulfuric acid is added in order to insure conductivity. Obviously other similar derivatives may be employed, and also other electrolytic substances in combination.

To illustrate, in addition to the cases of anesthetizing sensitive dentine described, the perfect local anesthesia which may be obtained by aid of the electric diffusion of the guaiacol-cocain combination, I will report the following crucial case which, while in itself a severe test, furthermore affords in the same patient a comparison with the hypodermatic methods. As will be seen, the advantage in this case is on the side of cataphoric medication.

Case of tooth-implantation.—December 11, 1895. Dr. William J. Younger, of San Francisco, now in this city, asked me if I would try the new guaiacol-cocain anesthesia and new electrodes upon a private patient of his who was to have a tooth implanted. Since such an operation, involving, as it did, deep cutting into tissue and drilling into bone, would be an excellent test both of guaiacol and the duplex positive pole electrode, I gladly consented, in the hope that these procedures might be of aid to dental surgery.

Mr. Wheeler, of the Electro-Therapeutic Co., kindly agreed to use the new "fractional volt selector," which, it may be here said, worked perfectly and in a manner impossible to any other current-controlling device for the current from the street mains.

The patient, Mrs. ——, was remarkably nervous and apprehensive and sensitive to pain, particularly since, in the morning, she had already undergone an implantation of a first right superior bicuspid. In this operation pain had been obtunded in the usual manner by hypodermatic injections of a solution of cocain, requiring from fifteen to twenty minutes and a succession of needle pricks. She had some after-effects from the cocain, particularly "a bad feeling in the throat."

The tooth implanted at this second operation was a superior left first bicuspid.

Adjusting the electrode to the gums at the spot devoid of a tooth, and packing in at one place where good contact was not established, some absorbent cotton saturated with the guaiacol-cocain solution, the current was turned on carefully. The negative electrode of the usual type was simply held by the patient in her hand. During the first three minutes the current strength registered one-quarter, one-half, three-quarters, and one and three-quarters milliamperes. During the next three and one-half minutes it was, in slow gradations, increased to two and one-half and finally to a limit of three milliamperes. The electrical resistance in the patient's circuit varied during the operation between 6700 ohms and 7240 ohms, never remaining constant more than thirty seconds at a time. The current caused little or no pain, and, if slight sensation of pain was felt, the current strength was diminished a fraction and then again increased, without pain, as anesthesia progressed. The electrode was removed in six and one-half minutes, and the operation proceeded with and finished in an additional eight minutes. The operation need not be described, since it is a familiar one, nor need it be added that it was skillfully done ; during the deep incisions and drilling out of bone the patient experienced no pain whatever, except when, on one occasion, the knife for an instant cut into a region which had not been included within the area of action of the electrode.

The success of the annihilation of the pain may be best expressed in the words of the patient. "I never could have believed it would be so painless ; it didn't hurt a bit. This is very much easier than the syringe." Dr. Younger stated that he decidedly preferred the cataphoric method with guaiacol-cocain to the injection of cocain solutions.

It may be noted that the total current strength employed was very small ; that one half of the time was spent in avoiding pain by raising the current strength slowly to a fair working point (here the value of the fractional volt selector was demonstrated) ; that no other portion of the mouth was anesthetized except that at the point of application of the electrode, and that no after-effects followed. The patient was examined the next day by Dr. Younger, and the resulting conditions were found to be perfectly satisfactory.

A second case of tooth-implantation.—December 14, 1895. This was also one of Dr. Younger's cases. In the absence of the writer, Dr. Edward C. Kirk made the anesthetic application and records, and very kindly sent his notes to me for use in this publication. The same solution and electrode was employed as in the first case. I transcribe from Dr. Kirk's notes as follows : "The patient was decidedly an unsatisfactory individual for a test experiment in one respect, namely, that either naturally or because of the physical and psychic impression produced by an implantation the day before he was in a condition of abnormally excited nervous sensibility. He gave expression frequently to exclamations which might easily be interpreted as expressions of pain actually felt, were it not for the fact that when at least 5½ milliamperes of current were passing at 40 volts pressure, he called for more, when previously at 22-23 volts he complained of 'pressure' of the electrode, showing conclusively that the pain of the current was obliterated by the cataphoresis of the guaiacol-cocain solution.

"The duration of the application to produce anesthesia was six and one-half minutes; two and one-half minutes were occupied in raising the current strength in gradations from one-tenth of one milliampere to four milliamperes; during the remaining three and one-half minutes the current strength was increased only from four to four and one-half milliamperes. Twice the patient complained of a sense of compression due to the current. Upon removing the electrode there was noted a bleaching of the mucous membrane over the territory of contact (coagulation). There was no sensation in the part treated; anesthesia was complete at the commencement of the operation. The patient remarked, 'It is nothing to-day to what it was yesterday' (*i.e.* by the hypodermatic method)."

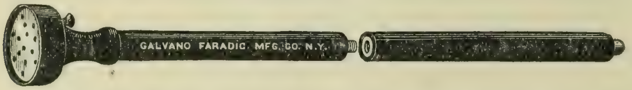
Removal of a large pigmented nævus.—December 17, 1895. In order to dispel any doubts concerning the efficacy of cataphoric procedures to produce local anesthesia both extensively and deeply, I anesthetized in two applications (owing to the relatively small size of my electrode, which was only one and three-quarters inches in diameter) a skin area beneath the axilla of three inches in length and one and one-half inches broad. The operation was performed at the New York Post-Graduate School and Hospital, by Dr. F. N. Wilson. The patient was Dr. F. P. Williams. Five minutes only were required to anesthetize the area beneath the electrode; the guaiacol-cocain solution was employed. Two deep linear incisions were made, each about three inches long and half an inch deep, in such a manner as to include the nævus and surrounding healthy skin, and the included piece then dissected up from the subcutaneous tissues. A slight burning sensation of the knife was felt only at a certain part of the long incisions which were made outside of the anesthetized area, but the dissecting out was absolutely without pain, as well also as the torsion of five small arteries and the insertion of ten deep stitches to close the gaping wound. No pain was produced in procuring the anesthesia. Referring to the torsion of the arteries by the clamps, the patient, a physician himself, said, "It's funny I can bear that clamp, because they usually jump out of the chair," and "I knew what he was doing, but it gave me no pain," etc.

It is noteworthy in this case that the anesthetic effects extended at least one-half an inch deep, and that there were no toxic effects of cocain (a sixteen per cent. solution in guaiacol was used). The absence of toxic effects seems to me to be due to the fact that the guaiacol holds the cocain in solution, thus localizing its action and preventing its diffusion into the circulation. This, if a fact, and it seems to be one, is of the highest importance; since the only objection which could be raised to the use of cocain so extensively and of such strength as described in the above instance would be the danger of the absorption of a poisonous dose, especially in a highly vascular tissue, such as the nævus operated upon.

No reactionary hyperesthesia followed, and the wound is healing by first intention.

A New Cataphoric Electrode.—The electrode which made the application to both sides of the gum possible, and also the fractional volt selector, may be here described. The cataphoric electrode as devised by the writer for use on the gums, and which has been used to benumb the gums and deeper tissues, resembles a pair of tongs whose blades encompass both sides of the jaw at the point to be operated upon. The flattened blades of the tong-like electrode constitute a shallow ebonite cup at the bottom of which rests a perforated piece of metal or carbon resembling the top of a pepper-box. Behind this perforated metal is a small reservoir for holding an excess of the fluid desired to be administered, and this fluid continually feeds itself through the perforations to a piece of blotting-paper exactly fitting the cup. In addition to these elements of novelty (the perforations and the reservoir), which have long been in use by the writer for percutaneous and permucous cataphoric applications, the further novel feature, which is entirely different from any similar electrodes hitherto employed to benumb the gums, and a feature moreover which alone makes it possible to accomplish this purpose, is the fact that *both* ends of the electrode are made to furnish one and the same polarity. If, for instance, one blade is made positive and the other negative, as is the case in a device of somewhat similar external appearance, then only the side of the gum at the positive blade will be rendered anesthetic ; the other side, the negative, will not be anesthetized. This faulty construction and conception of cataphoric medication probably explains failures.

FIG. 1.



RESERVOIR CATAPHORIC ELECTRODE.

This electrode is made of pure tin or of carbon, with hard-rubber covering, has two screw-joints, so that it may be easily taken apart and cleaned. When in use, blotting-paper or other absorbing material is to be placed over the face of the perforated disk, which is chambered at the back to receive the medicine.

Fractional Volt Selector.—The fractional volt selector (see illustration) is a device for controlling the electric current derived either from the street mains or from galvanic batteries. Its peculiarity consists in the fact that it selects current in small degrees or gradations of voltage, thus allowing the operator to increase the current strength in minute quantity. In a crude manner voltage may be increased by aid of the ordinary cell selector used with batteries, but it is obvious that there will be in this case jumps of current of a degree corresponding to the voltage of the sort of cell in circuit. If, for instance, this cell were any form of the Leclanché, the jump would be of about one and one-half volts. In the fractional volt selector the jump is less than one-quarter of one volt. By reason of the fineness of these gradations, the pain incidental to turning on the current is avoided, and this is an exceedingly important feature in the application of electric currents in oral surgery.

From the above presentation we may draw several conclusions.

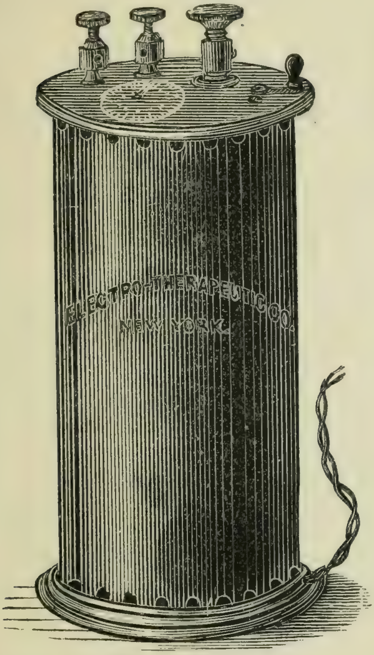
1. Electric medicamental diffusion ("cataphoresis") is not only a possible but also a practical procedure, since,

2. Sensitive dentine may, with the greatest ease, be so thoroughly anesthetized that operations upon it and in it cause no pain.

3. The dental pulp, even though not fully exposed, may be anesthetized so that instruments may enter the pulp-cavity without causing pain. See Case 1, Experiment 2.

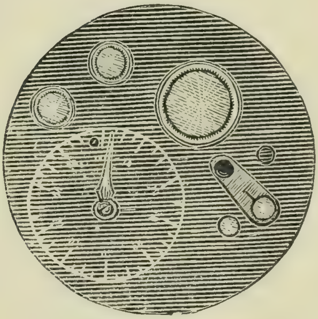
4. By employing a properly constructed electrode, soft tissues like the gums may be completely anesthetized to the pain of cutting and tearing operations.

FIG. 2.


ELECTRO-THERAPEUTIC CO.
NEW YORK.

FRACTIONAL VOLT SELECTOR.

FIG. 3.



TOP VIEW OF INSTRUMENT.

5. Soft tissues like large areas (three inches by one and one-half inches by one-half inch deep) of the derma and subjacent tissue may be completely anesthetized for surgical operations.

6. Guaiacol alone, and other similar substances and derivatives, in themselves non-conductors of electricity, by the addition of a very minute quantity of some innocent substance of an electrolytic nature, may be caused to penetrate tissue by the aid of electricity, and thus exhibit anesthetic effects unobtainable without the aid of the added electrolyte.

7. Guaiacol restrains the action of cocain to local territory; increases the rate of its cataphoric penetration through the epidermis and other tissues; slows the rate of its absorption into the system; prevents consequent toxic effects, and adds its own anesthetic qualities to those of cocain.

THE LAW OF PREVENTION VS. THE LAW OF CURE.

BY SIDNEY S. STOWELL, D.D.S., PITTSFIELD, MASS.

(Read before the First District Dental Society of the State of New York, November 12, 1895.)

THE civilized world is to-day suffering under the bane of a disease which is nothing less than a pestilence, insidiously attacking alike the rich and poor of all classes and conditions of the human family; a disease which was to a limited extent known to the ancients, and which has grown in frequency and severity with the increase of population and the advance of civilization, until, like the plagues of recorded history, not one escapes. So stealthy has been the advance of this dread disease that humanity receives it as one of the inevitable woes of providential dispensation.

Without asking the reason why, men in the early ages set up a feeble defense by establishing repair shops, where, as the organs of the body were attacked and eaten away by this painful, loathsome, and disfiguring disease, patches were put on to temporarily check its ravages; and when finally the organs were eaten entirely away and lost, artificial substitutes were inserted which clumsily served their purpose. As a wooden leg is better than no leg, so artificial teeth are better than no teeth; likewise a glass eye, a wig, and a rubber nose; but the loss of the organ is none the less deplorable. If we may credit the words of Isaiah the prophet of old, that a book of knowledge should be opened and that knowledge should increase, the seal of that book was broken with the opening of the nineteenth century, when mighty men arose who were well skilled in the arts of the human repair shops. Page after page has been turned, until the ingenious inventions of man seemed almost divine.

In the dental department of our human repair shops, I believe we have almost reached the highest possible attainments, while in other departments much has yet to be accomplished. The dental repairer claims the honor and title of doctor and professor; the business of the repair shop is called a profession. Do we merit the title? I question. Would not the dental mode-man, the dental artisan, the dental mechanic be more just, when we consider that as doctors and professors of dentistry we do the title so little honor?

Let us reflect. As professors we should understand; as doctors we should teach. Are we doing so? No, I say, we are still in the repair shops. Skillful? Yes, a few who entered the craft for pure love of mechanics and mechanical manipulations; unskilled, the many who entered, without natural ability, because they saw a possible salary of twenty-five dollars a week or more. As fools would we be classed if some did not show marked skill in this clever age. Therefore, why do we boast when we mark the intricate productions of this century in other branches of industry? For example, the modern looms weaving the numerous classes of fabrics, and all the electrical mechanism and science.

A lawyer of renown said to me that I was only a dentist; anybody with fair mechanical ability could pull or fill a tooth. I could not dispute him, as he had, to say the least, the law on his side; and I have seen as good gold fillings as I ever saw inserted in teeth by a man wholly ignorant of the science of dentistry, who seemed to have an occult conception of the mechanical principles of the art ; and we all have seen the botches which educated men have made in attempting a similar operation. That we are useful men and our repair shops are a necessity to the world I will not attempt to deny.

So bold and fierce has been the spread of this disease that our generation of repairers need never fear of running short of work. We have exhausted our resources to understand the pathological conditions of this disease. We have found that a germ or microbe, acting upon sugar and starch, generates an acid which dissolves the lime from a tooth. This is said to be the cause of dental caries, which is the most prevalent form of this painful disease of the human teeth. I say it is *not* the cause, but only an existing condition, and that for the true cause we must look to a broader source,—to the physical development and maintenance of the organ,—for are not the air we breathe, the water we drink, and all foods pregnant with deadly germs? and yet we do not die ; while under favorable conditions, brought on by starving and lowering the vital forces of the body, one of the many millions of these germs might prove fatal.

And so we continue repairing, putting on patches, putting in a filling, charging a good fee for the same, and tell the patient to come in again in three or six months for more repairs and patches ; and so on through life, patching and repairing, busy with our cures, but offering no preventions. We are not living up to our convictions. We are not honest men, although we may do a conscientious repairing operation, so far as the operation is concerned ; but our duty does not end there.

We are handicapped in our honest efforts by the many social problems which surround us : expensive offices and homes ; the luxuries with which we have surrounded ourselves ; the standard which we have established must be maintained, and the profession must be run on business principles for business purposes, for all the money we can get out of it. With this condition of things, we have little time to spend upon social or dietary reform. It is true we have put forth a mighty effort to arrest this disease of the teeth, and it is evident that we have practically failed. Have we done all we can do? The plague is still upon us, and decay still goes on. We must find a preventive, and this must come through perfect physical development of the whole body, and along this line of thought must our conscientious and earnest efforts be directed.

Reasoning from a most rational hypothesis, let us consider :

First, all plant and animal life must draw its nourishment from sources containing, in sufficient quantity, their physical constituents. As animals, it is evident that we develop and subsist solely upon such substances as are taken into the body, by way of the mouth, as foods. With this fact made clear, it is plain that such foods must contain, in definite proportions, precisely the chemical elements of which our bodies are composed, or perfect development is impossible. For example : a child deprived of lime phosphates in its foods has rickets, curvature of the spine, and loss of teeth. An adult eating an excess of starch in the form of fine white flour has gout, rheumatism, and obesity, with early loss of the teeth. A person, young or old, subsisting chiefly upon pies and cakes and other fancy pastries and desserts, as is the case in many well-to-do families who boast of their good living, loses his teeth in spite of eternal vigilance and the most skillful dentistry.

Cases of this kind can be cited without number, and usually these people will not listen to a talk upon dietary reform, but blame the dentist and their Creator, spurning the wholesome loaf of entire wheat bread because it is brown of color, and choosing the almost worthless white bread because it pleases the eye and a whimsical fancy, not knowing or heeding the fact that one loaf of the entire wheat bread contains four times as much proteid matter as an equal weight of white bread.

Let it be understood that color is a sentiment, and that there is no principle of physiology which bases quality of food upon whiteness. That so-called educated people, in a civilized country, who claim so great knowledge of the science of common things, should be satisfied to live on in ignorance of so important a matter, is appalling. That to please the eye or gratify a depraved taste should be paramount to an intelligent diet, developing and maintaining the body in a state of perfect health, without which the greatest riches and luxuries are in vain to comfort and happiness, is beyond comprehension. By the all-wise and unseen laws of nature, the stalk of corn, in its growth, selects its chemical constituents in definite proportions, and only thrives and is fully developed where these can be found.

The lower animals, by natural instincts, select their foods in such accurate proportions as to be invariably in a state of health ; while man, the noblest work of God, and the lord of creation, selects his by sentiment, cultivating and gratifying a depraved taste, and living upon his sentimentality until there is no health in him. It is unworthy of our race that we thus continue. Let us reflect, and look to a nobler end.

I have stated that the lower animals have instincts directing the choice of their foods. We, also, have instincts,—if we will closely observe, and not stunt and ignore this law by vanity or overeating, —to read this law.

For example : When one is weary from mental or physical labor, and hungry, those foods most needed will come first to mind, and impress it most strongly, unless long-continued sentiment and depravity have dwarfed the senses. Physically, the indications are as plain as the sign-boards to the city of refuge, so that one can run and read, and yet we seek not that city.

The dentist, possessing superior knowledge of the teeth, should instruct his patient as to the best means of preserving them by dietary principles of prevention, some of which may here be mentioned. Pre-eminent among all destructive foods, and that most used, is common white flour, which with its one chief nutrient, starch, is molded into several thousand different dainties, all of which are supposed to form a variety of foods, while as a fact all come from the same barrel, and, but for the slight variation in the proportion of sugar, eggs, and spices, are all alike.

As there are about fifteen principal elements entering into the composition of the body, it follows that perfect development can only be had in presence of all these elements in sufficient quantity ; and as the foundation or framework is largely composed of lime phosphates, it is evident that these must be supplied in the food ; and yet as a people we eat largely of that mutilated and unnatural product, white flour, which contains no lime, while the whole kernel, or entire wheat, contains all of the fifteen elements of which the human body is composed, and in about the same proportions ; and for this reason it may be called the natural food for man.

The gluten, which is the life-giving principle, is in the foolishly fashionable white flour entirely left out. There is no food so worthless and for which there is so little compensation for eating as common white flour, and it is time that we considered the consequences it is silently entailing upon us, and upon our children and our children's children ; and if we will continue thus to sin against our own bodies, it is cruel to feed our children upon so imperfect a food, entailing imperfect development, physical degeneration, and disease upon them. Place the entire wheat bread upon your tables, and the children whose instincts of taste have not been vitiated by habit will soon convince you that it is a natural, wholesome, and healthful food, and to your own taste all other breads will soon seem flat, insipid, and unsatisfying.

In this connection I cannot speak too highly of the efforts and results which Dr. William L. Johnson, of Boston, has accomplished by putting before the people a delicious variety of wholesome and healthful foods made from that royal grain, the wheat kernel, which the Franklin Mills Company so skillfully grind, giving us all that is good for nourishment in the natural kernel in the most palatable form.

As the laws of nature are unerring, so man may live in perfect health to the fullness of his time, if he will live near to nature and study her laws, which bid him eat of wholesome food, that containing the nutrient salts of which the body is composed, and that which requires a degree of labor in mastication sufficient to give the teeth ample exercise for their health, and to incorporate the food with the salivary secretions of digestion that perfect assimilation may take place and the maximum benefit result.

It has been my effort to show that man's normal diet will sustain his teeth, as well as his whole system, in good working condition to a ripe old age. We should eat to live, not live to eat. He who eats to live has solved the problem of life. From dietary reform, and not from the dental repair shops, must come the dental millennium when immunity from dental caries shall prevail, and the dentist shall till his farm and insert new teeth only in his hay-rake.

If the dental profession of this century would erect to its memory a monument upon which future generations serenely may gaze with hearts full of gratitude, it should bear this inscription :

"To the sacred and honorable memory of the dentists of the nineteenth century, who, by their great wisdom and scientific efforts, brought immunity to all people from that loathsome, painful, and disfiguring disease of the human teeth which prevailed throughout all the world in those days."

A lady standing by is heard to remark, "How dreadful to have lived in that time when one's teeth decayed and dropped out, and one had to spend so much time and money at the dentist's to have them filled or artificial teeth inserted ! How horrid they must have been ! Can you imagine anything so dreadful ? And yet I am indebted to one of the modern craft, for you remember the day I was picked up so ungracefully on the fender of that old-fashioned motor-wagon. Falling against the iron, I fractured an incisor, but I went to a stomatic specialist and he performed so beautiful an operation of restoration that no one could detect that the tooth had ever been broken. See!"

IRRITATIVE OR REFLEX TRISMUS.

BY J. S. IBBOTSON, L.D.S.,
DENTAL SURGEON TO THE MONTREAL GENERAL HOSPITAL, AND
W. GORDON M. BYERS, M.D.,
SENIOR HOUSE SURGEON MONTREAL GENERAL HOSPITAL.

(Read before the Medical Society of the Montreal General Hospital, October 7, 1895.)

THE affection forming the subject of this paper is one which, although more especially belonging to the domain of dental surgery, is nevertheless interesting to the medical man, inasmuch as the cases more often apply to him for treatment than to members of the dental profession. The lesson, too, of having a well-equipped department for the care of the teeth in connection with all large institutions such as this will, we are sure, not be lost.

The following are the notes of two cases which were treated in this hospital during the winter of 1894–95:

Case I. (Service of Dr. J. Alexander Hutchison.)—Robert R., aged twenty-three, a fireman in the employ of the steel and iron works, came to the General Hospital on December 11, 1895, complaining of "stiffness in the muscles of the jaw, and inability to open widely his mouth." He said that five weeks previous to entrance the right side of his cheek began to grow painful and the gums of the mouth tender when touched, or more especially when he attempted to eat anything hard. This continued for two weeks, when swelling of the right cheek commenced and gradually increased; and at the same time the jaw-muscles slowly stiffened and finally became so rigid that he could not without difficulty masticate his food or speak distinctly.

On entrance, patient was found to be a young man of medium height and well nourished. The acute inflammatory symptoms had evidently subsided in part, but a large swelling of the right side of the cheek was present. This was due to an enlargement of the parotid gland, and hot fomentations were applied, the case being looked upon as one of non-specific parotitis with closure of the jaw as a secondary consequence. The case, however, dragged on for a week or so with no improvement, when the teeth were thought of and found to be the cause of the trouble. The upper right bicuspids and first molar were found to be in a carious condition, and elongated; and the gums in the neighborhood in a state of subacute inflammation. The third molar was seen in a half-developed condition, appearing through overhanging gums. Below on the same side the third molar was "erupting" and crowded in between the second molar and the ramus of the jaw. The gums, too, in this neighborhood were inflamed, and overlapping and tender.

On December 29 patient was given ether, and the mouth forced open by a gag with considerable difficulty. The upper third molar in a carious condition and the lower right third molar in an embryonic stunted state were removed.

Almost instant relief of symptoms was experienced. On the following day the patient could move his jaws to a considerable extent, and on January 2 he was discharged as cured.

Case II. (Service of Dr. R. E. Kirkpatrick.)—Thos. F., aged fifty-four, a strong, well-built navvy, was admitted into the General Hospital on March 9, 1895, complaining of stiffness in the muscles of the jaw, sudden uncontrollable closures of the teeth, and darting, shooting pains in the right side of his cheek and head.

He gave the following history: Soon after an exposure during a very cold spell of weather, patient was seized on January 2, 1895, with pain and stiffness in the muscles of the jaw, particularly on the right side; and also with this he suffered from darting, shooting pains in the ramus of the jaw and right side of his face, which extended up to the ear and side of his head. These symptoms gradually increased so that on February 2 patient had to give up work on account of his being unable to take anything but liquid food, owing to the almost entire closure of his jaw, and to the pain which he experienced when he shut his teeth on anything hard.

About January 15, peculiar involuntary spasms of the muscles of the jaw appeared, first noticed when on putting his pipe into his mouth the bowl flew up into his face, on account of the sudden coming together of his teeth. This condition, too, increased in severity and became almost alarming. On one occasion during a very severe closure the two lower incisors were knocked out, and at frequent other times his tongue and cheeks were badly bitten. Sometimes the closures came on spontaneously, and always when an attempt was made to put a pipe or finger or probe into his mouth.

Condition on entrance: A well-built, shaggy-bearded man; hair turning gray; nutrition good.

Complains of tenderness and stiffness in the muscles of the jaw, particularly on the right side, with a dull pain in that region, and occasional shooting, darting pains in the side of the face and head. He cannot open his mouth widely, and for this reason has to live on soft food. A more serious trouble is the spasms of the jaw spoken of above, causing the teeth to come together with a snap. These come on when an attempt is made to put anything into his mouth, but very often without any cause at all apparent.

Examination.—Swelling of the submaxillary gland on both sides, and slight thickening of the right ramus of the jaw in about its middle third; corners of the lips and the tip of the tongue show marks of the teeth. Patient can only open his mouth to about one-third or one-fourth its normal extent. Breath very foul. Teeth present an elongated and extreme carious condition of the first and second molars of the lower right side, the gums around which are filled with salivary calculi. On the lower left side are roots, remnants of the first, second, and third molars, all in a state of ulceration. The lower incisors are wanting, and there is partial fracture of the lower front alveolar process, owing to the severe spasm mentioned above. On March 20 Dr. Ibbotson removed the right lower first and second molars, the roots of which presented an exostosed condition; also remains of the first, second, and third molars on the lower left side. In front, below, a small piece of necrosed alveolar process was taken away, and above on the left side, the upper first bicuspid root in badly ulcerated condition was extracted.

The patient's progress after the operation was most satisfactory. On March 28 a bedside note records that he had fully regained the use of the muscles of the jaw, and had had no further spasms. A few days after this, however, a slight return of this trouble occurred; but the removal of a small piece of loose necrosed bone from the lower right ramus speedily set matters right again.

To summarize briefly these reports, we have the following facts:

1. Both patients were males: one a young adult, twenty-three years of age; the other a man in the prime of life.

2. In both instances the trouble was located on the right side.

3. Both patients, although having different occupations, were subjected to extreme degrees of cold, the younger man being rendered more susceptible by his work at the mouth of a furnace.

4. Both cases were marked by prolonged spasms of the masseter muscles, more or less complete closure of the jaws, inability to masticate anything but soft food; some difficulty of articulation, and pain and tenderness. In the elder of the two were peculiar involuntary clonic spasms of the muscles, which could be elicited at will, but often came on spontaneously.

5. In both instances carious teeth were present, and the gums showed various degrees of inflammation.

In one case there was partial non-development and crowding of the third molars.

6. Extraction of the diseased teeth produced a return to the normal condition of things in both instances.

Spasm of the muscles of the jaw as a result of reflex irritation from local conditions in or about the mouth is by no means unrecognized in literature; and the subject receives more or less attention in all the standard works on general and dental surgery. Natsham, Erichsen, Moulin, "American Text-Book of Surgery," and the "American System of Dental Surgery" all make mention of the condition. In this hospital, however, no cases similar to those described above have come under observation for a great many years, and in a careful perusal of the DENTAL COSMOS for the past twelve years we were unable to find a detailed report or even allusion to anything of a similar nature. We must therefore conclude that although spoken of in the literature as being of comparatively frequent occurrence, the condition is in fact rather rare, at any rate in as marked form as the cases cited. Moulin, the only authority who dwells on the point, mentions that the affection is most common between the ages of twenty and thirty-five. All the works cited speak of the eruption of third molars as a cause, but one of them recognizes caries of the teeth as an etiological factor.

The affection, too, is generally described under some general heading, such as "closure of the jaws," or "spasmodic closure of the jaws," along with other conditions, which, as regards the *modus operandi*, bear no relation whatever to the cases which we here report.

Compiling from the literature, and with additions of our own, we find that the following are the conditions which bring about closure of the jaws, and which for the sake of convenience may be classified under the following three headings :

A.—General causes :
  1. Tetanus.
  2. Strychnin poisoning.
  3. Hysteria.

B.—Local causes :
  1. Tumors or new growths in the neighborhood of the jaws.
  2. Disease of the temporo-maxillary articulation.
  3. Bands and adhesions.

C.—Local reflex causes :
  1. Eruption of teeth.
  2. Carious teeth.
  3. All forms of acute inflammation whatever, involving the lower jaw itself, tonsils, parotid gland, or other structure in neighborhood. (Moulin.)

Excluding all others, it is to the third division of this classification that we wish particularly to call attention.

We are all well aware that local conditions in or about the mouth, and especially of the teeth, produce reflex disturbances in the eye and ear and brain and other parts ; and we can therefore understand how, in the same way, many local buccal inflammatory conditions, caries of the teeth, or the irritation dependent on the eruption of a third molar, can and do often produce, either through the instrumentality of the nerves or by direct muscular stimulation, a reflex spasm of the jaw-muscles.

Inasmuch, then, as the factors in the production of this phenomenon are well known, and the rationale understood, we propose that it should be isolated as an entity and given a name ; and we beg to suggest the term "Irritative or Reflex Trismus."

◆

PROCEEDINGS OF SOCIETIES.

SOUTHERN DENTAL ASSOCIATION.

Abstract from Official Report.

THE Southern Dental Association convened in twenty-eighth annual session in Atlanta, Ga., November 5, 1895. The meetings were held in the chapel of the Y. M. C. A. Building.

The meeting was called to order at 11 A.M. by the president, Dr. H. E. BEACH, Clarksville, Tenn.

The session was opened with prayer, offered by Rev. J. B. ROBBINS, of Atlanta.

An address of welcome was then read by Dr. FRANK HOLLAND, Atlanta, chairman of the Committee of Arrangements.

The president then read his annual address. He alluded to the fact that twenty-six years previously the Southern Dental Association was organized in Atlanta, and drew attention to the progressive changes and improvements which had taken place in Atlanta, the birthplace of the association, as well as in the profession of dentistry.

He referred to the fact that at the time of the first meeting in Atlanta the city and country were just emerging from the dark cloud of war which had hovered over it for four years, while to-day the hearty hand-clasp of brotherly love is given alike to North, South, East, and West.

With reference to the work of the association, he recommended that a careful record be kept and, where possible, embodied in the reports of committees, to be referred to the association for its discussion and deliberation, in order that some authoritative expression of the views of the whole body might be formulated for the benefit of those whom it was the function of the association to educate.

A course of this character would enable the association to put its seal of disapprobation upon the efforts of those who, by means of the meetings or clinics, showed a disposition to advertise themselves or their work in contravention of the code of ethics.

He further recommended that some means be taken by dental colleges to prevent the entrance of men of low moral standard into the ranks of dentistry. He called attention particularly to the well-known fact that there frequently crept into the dental classes men who were guilty of theft, and radical measures should be taken by the authorities to punish such offenders when found.

In reviewing the question of the proposed fusion of the American and Southern Dental Associations, he expressed the belief that any of the now existing dental organizations were not qualified by the nature of their plan of organization to assume the prerogative to legislate or prescribe rules for the government of the profession at large. In order to do this there is needed a national association, the membership to be wholly representative, and elected by the organized societies of each state in proportion to the number of registered dentists in each state. They should meet annually at some central point, and be clothed with authority to formulate rules,—ethical, legislative, and judicial,—on all questions concerning the dental profession.

After making a number of suggestions for the betterment of the working plan of the Southern Dental Association, the president referred to the great loss which the profession had sustained in the death of Dr. John J. R. Patrick, of Belleville, Ill., and Dr. W. H. Gingrich, of Norfolk, Va.

The address of the president was referred to a committee of three for consideration and to report at a later session.

After the transaction of further routine business, the association adjourned till 2.30 P.M.

Afternoon Session.

The Committee on Prosthetic Dentistry reported a paper by Dr. W. E. WALKER, Pass Christian, Miss., on "Prosthetic Dentistry," which was then read by the author.*

Discussion.

Dr. J. ROLLO KNAPP, New Orleans. I am sorry that Dr. Bonwill is not here to speak upon this subject. I was present at an interview between Dr. Walker and Dr. Bonwill this morning, when the subject was discussed. As Dr. Bonwill is not here, I will endeavor to state the case from his standpoint. Dr. Bonwill claims that a perfect occlusion can be got in his articulator; Dr. Walker thinks it cannot.

---

* Dr. Walker's paper appears in full at page 34, this issue.

Dr. Walker claims that a drop in the glenoid cavity is necessary to bring about perfect articulation.

Dr. Bonwill says he can get it in his articulator; Dr. Walker says it requires a modification of Bonwill's articulator to reproduce the articulation seen in the mouth, which cannot be done with Bonwill's articulator; Dr. Bonwill says it is because Dr. Walker don't know how to use the articulator.

That is about the way I understand the situation.

The CHAIR. The subject of prosthetic dentistry is open for discussion, whether from the standpoint of the paper read or otherwise; the whole field is open.

Dr. B. HOLLY SMITH, Baltimore, Md. This is one of the very best papers ever read before the association. It is a matter of pride and gratification to have with us a gentleman who has given such minute investigation and careful study to a subject which comes before us every day, and which is one of very great importance. As a rule we give our work in this line to a mechanic, a man who never sees the mouth. He slaps up a set of teeth, with all the cusps obliterated; we put it in the mouth and the patient goes away satisfied, because he does not know there could be anything better.

The nice, clear distinctions made in minute particulars are a matter of wonder and astonishment, and deserve our congratulations. I am pleased to have listened to such rational views, and cannot but think that his conclusions are correct and will be demonstrated by his instrument. The matter of the articulation of the teeth is certainly one of major importance to us.

Dr. W. T. POOL, Columbus, Ga. No articulator can be as good as the mouth; we can all see the teeth in the mouth, and feel the working of the jaw. But we can also appreciate drawings of the normal mouth and of the natural teeth, and I believe that the explanations and conclusions given are correct.

Dr. T. M. ALLEN. I hope this subject will have free discussion. Prosthetic dentistry is too often passed without proper consideration; it is less understood and receives less study than any branch of our work. I hope we shall hear especially from those who have made it a specialty, producing scientific work.

Dr. L. P. DOTTERER. A number of years ago, in our local society, the subject of the occlusion of artificial teeth received very full discussion, especially as to the length of the cusps. The two oldest men in our society, men who do the most work and who appear to give satisfaction, were appealed to to decide the question. They both agreed that the most satisfactory dentures for practical use were those where there were no cusps to interlock; that the patient would get along better without cusps, as there would be less liability of tilting the upper plate and of knocking around the lower plate, which has no suction. I do not believe in grinding away quite all the cusps, but I do not make the palatal cusps longer than the buccal. I wish, however, to congratulate the essayist on the paper, which shows considerable study and investigation. But in our artificial appliances for the human jaw we do not put in human teeth; we put in artificial teeth, and they must always be artificial constructions. I do not believe that artificial teeth with natural cusps would give the greatest satisfaction to the wearer.

Dr. J. Y. CRAWFORD, Nashville, Tenn. I wish to congratulate the writer of the paper. We should offer every encouragement to gentlemen who can do such work as Dr. Walker is doing. I hope you will give the paper proper discussion, and such as will make him go further in this work. His paper contains much that is original and new, and I am obliged to him for many suggestions. I feel quite sure that he is right in his conclusions and in his description of the movement of the condyle in the glenoid fossa. I have been convinced myself of the slight backward and upward movement in the glenoid fossa of the condyle, which is said to be stationary or to only rotate in certain movements, and as to the rocking motion I am quite sure he is right.

I am particularly pleased that he has directed your attention to the upward curve from the bicuspids backward, as I have a full appreciation of that fact, and a great regard for that idea in the construction of artificial dentures for edentulous mouths as an essential point in overcoming the irritation of the tongue, caused by wearing artificial dentures where that feature is not recognized, and which is often supposed to be due to the plate going too far back. In fact, a certain eminent dental metallurgist emphasizes that as a general fault, and says, "When you have cut enough and cut as far as you dare, *cut a little more!*" A careful study of articulation will enable us not only to properly construct dentures for edentulous mouths, but it is very important in enabling us to give the proper occlusion after our treatment of the teeth by fillings. I appreciate Dr. Bonwill's as a practical articulator, enabling us to give a comfortable occlusion, so made that when the jaw is brought into any position there may be three simultaneous points of contact.

With a denture so constructed we can mash the ordinary food we use, and this can be done with any articulator. With the aid of articulating paper, disks, etc., we can modify the grinding-surface and produce quite satisfactory results. There will always be a difference between using the natural and artificial teeth. With the latter we must rely on the up-and-down motion.

All kinds of food do not require to be ground under the teeth; much can be simply mashed. Artificial teeth give immense results, but it is hardly possible to get with them the process of grinding; our patients are satisfied with the mashing process. I hope, however, that the gentleman will continue his studies, which have a practical bearing in other directions than the construction of artificial dentures.

Dr. WALKER, being called upon to close the discussion, said,—

I thank the gentlemen for the kind reception accorded my paper. In my opinion this is a very important subject, and the more I study it, the more its importance is impressed upon me in its varied bearings. The gentleman who first spoke has misapprehended my position. I do not say that Dr. Bonwill's articulator will not give a good *occlusion;* on the contrary. But I do say that teeth articulated on his articulator, by his method, will not *articulate* in the mouth, in the lateral motions of the jaw ; the cusps will not touch as do those of the natural teeth in the mouth. Teeth without any cusps at all will *occlude* in the up-and-down motions of the jaw ; but to properly masticate food it is necessary to have cusps, as much so with artificial as with natural teeth. Artificial teeth can be properly constructed, with normal cusps, and made to articulate in the mouth, in the lateral movements, as shown in the diagram, but not if set up in an articulator which makes no provision for the drop of the condyle in the lateral movements of the jaw. It is true that edentulous patients have been taught to make only the up-and-down motions, with teeth with scarcely any cusps at all, using only such food as could be prepared for swallowing by merely mashing ; but that is not mastication, and such teaching is not necessary with teeth with properly articulated cusps.

Dr. L. P. DOTTERER. I would like to ask Dr. Walker if, by the methods he describes, teeth can be so perfectly articulated that, when placed in the mouth, it will not be necessary to touch them with the stone? I mean for full upper and lower teeth.

Dr. WALKER. The materials with which we work are not infallible ; plaster may give way, or some slight change in position may occur during the process of vulcanizing, if we use rubber ; but *in the wax* the articulation can be made as perfect as Dr. Dotterer describes. They may have to be slightly touched, through some fault in the plaster or some mishap in vulcanizing, just as with gum-sections, though most nicely jointed when invested, yet after vulcanization we sometimes find that a block has been displaced, due to the yielding of the plaster. With plain teeth the liability is still greater, there are so many points at which the plaster can yield, necessitating a slight touching of the cusps when placed in the mouth ; but the method of articulating is not responsible for that.

One point demands more attention, and that is the importance of articulation in its relation to the disease known as pyorrhea alveolaris. Malarticulation has very much to do with this trouble, both as a cause when it is of purely local origin, and as an aggravating factor when the disease is of systemic origin. With casts of the teeth in a proper articulator, the exact point of malocclusion is readily located, when the remedy becomes apparent.

On motion, the subject of Prosthetic Dentistry was passed, subject to recall.

(To be continued.)

FIRST DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

THE First District Dental Society of the State of New York held a regular monthly meeting Tuesday evening, November 12, 1895, at the New York Academy of Medicine, No. 17 West Forty-third street ; the president, Dr. John I. Hart, in the chair.

Dr. GODDARD, of California, was introduced by the president and invited to address the meeting.

Dr. GODDARD. I bring you all a greeting from the Pacific Coast, and wish to say first of all that we shall have a dental congress in August, 1897, and we hope to see you all there. We shall invite the American Dental Association and the Southern Dental Association to meet on the Pacific Coast that year, and hope that all who are present will do what they can to make the meeting a success in that locality.

I happen to have with me a cast that may be of interest on account of its great size. I left my home hurriedly, and did not have time to prepare it properly ; it is just as it came from the mold ; it is a copy of the cast of the teeth of an ex-king of the Samoan Islands. The impression was taken by Dr. John Reade, a graduate of the Ohio College, who practiced in California for several years. He spent six or seven years traveling around the islands of the Pacific Ocean and the shores of Southeastern Asia. The teeth are unusually large, and, while there would seem to be plenty of room, there is still a crowding of the incisors. Dr. Reade said he had been doing some work for the king's sister, and obtained the privilege of removing the tartar from the king's teeth, making him believe that taking an impression was part of the operation. The king himself was very tall and large, and Dr. Reade reported that his jaws protruded considerably, and it was from seeing these projecting jaws that he desired to take the impression, so as to preserve the cast. I have another specimen that is of interest from the fact that the right superior lateral and cuspid have changed places. If the incisors are always developed in the intermaxillary bone and the cuspid in the maxilla, the question with me is how they crossed the suture.

Dr. STOWELL. I also have with me a very large model. The dentist who took the impression is a personal friend of mine. The impression was taken preparatory to the insertion of an artificial denture. The dentist told me he took a shingle and built around it a form of wax, into which he placed plaster of Paris and got an approximal impression-cup, and then took the impression in plaster of Paris. He did not mention what was the size of the man. I also have here a model of the mouth of a lady, thirty-eight years of age, which is remarkably small. It was taken from the artificial plate which she wore.

Dr. F. MILTON SMITH. A lady patient came to my office about two months since, bringing her baby, who was thirteen months old, and asked if I could tell her what was the matter with the baby's mouth. I found the condition of the gums to be exactly as was described by Dr. Kirk in his paper on "Infantile Scorbutus." The gums were so swollen as to nearly cover the two upper central incisors, which were almost fully erupted and had the appearance of a wild cherry—that shape and color—and were puffed up all around the teeth. The child had been under the care of two physicians, and the gums had been in that condition for some weeks. The physicians had not helped the child at all. I asked the mother what the other symptoms were, and if the child had been able to walk. She said previous to this condition it had been able to walk, but for the last six or eight weeks it could not stand on its feet. She said the little one did not want its legs touched, and, altogether, it seemed to me to give every indication of infantile scorbutus. I asked the mother on what she had been feeding the baby. She said Horlick's Malted Milk ever since it was born. She had not yet given it any bread and butter or anything else. I immediately suspected that the malted milk was responsible for the condition. She said one of the physicians said the child had rheumatism, and the other thought it had dental paralysis. They cautioned her particularly about the food, advising her not to change it, as the little one's digestion seemed to be good. She said she had prepared the food with water only, until some two or three weeks before, when she had put in a little milk, and since then she thought the child was a little improved. I told her to give the little one some good cow's milk and the next morning get some beef, heat it, and squeeze out the juice, putting some crumbs of bread in it, and give it to the child, and, if it got along nicely with that, to give it, in the course of a day or two, some orange-juice. In two weeks she brought the child in to me and the gums were all right; it looked cheery and well, and did not have that pinched look that it had before. The mother wrote me a letter expressing her great gratification for the relief I had given the baby, and for the helpful suggestions I had made.

When the subject of Dr. Kirk's paper was read, the question occurred to me, How many times will we see cases of infantile scorbutus in our practice? I thought they would go to physicians and not to dentists. In this case the physicians had overlooked it, and, had it not been for Dr. Kirk's paper, I should probably have overlooked it too. Dr. Northrup said there had been reported between one hundred and one hundred and fifty cases of infantile scorbutus, and I thought we ought to get credit for reporting at least one.

Dr. SIDNEY S. STOWELL, of Pittsfield, Mass., then read the paper of the evening, entitled "The Law of Prevention *vs.* The Law of Cure."*

Discussion.

Dr. E. PARMLY BROWN. The paper of Dr. Stowell is a very good one, as far as it goes; but it does not cover the entire ground. The human teeth to-day are not wrecked by one thing, but by many things. Brown bread in preference to white bread is a large step in the direction of building up the osseous system. I said ten years ago, before the Odontological Society, that the excessive use of common salt is disintegrating the teeth more than any one cause. That excess goes into hydrochloric acid, and comes into the mouth in the breath or other ways and disintegrates the teeth.

In my own family I have an illustration that is worth mentioning. Three months ago to-day I saw the skull of my brother, who died eighteen years ago. I examined it, and the teeth are like beautiful pearls. I remember my older brother, who was twenty-eight years old at that time, had not a single decay in his teeth. That brother and the other brother I mentioned used tobacco from the time they were small boys, and they did not use a great amount of salt. My oldest brother ate no meat whatever. They both died of consumption; but all the other members of the family are living. They do not use tobacco, and they have decay of the teeth. They were brought up in the country while their second set of teeth were erupting, although they were born in the city. My father was a dentist, and a teacher of dental hygiene, and he took care of those boys' teeth. It is the environment as well as the care of the teeth that will save them. Savages who use crude foods grind their teeth to the gums at the age of about forty-five.

---

* Printed in full at page 54 of the current number.

Dr. W. Irving Thayer. It is a little singular that the essayist, and Dr. Smith in the case he has reported, should approach each other so closely. The food that child had was the very poorest kind of an artificial food, having the least quantity of the calcareous salts of any food whatever. It is almost devoid of any elements that will make strong teeth, and is quite liable to produce the scorbutic trouble that the doctor complained of. When he made the suggestion to change that food to cow's milk, which contains most of the elements that the human system requires, he reports almost instantaneous improvement. The orange-juice afterward assisted a little in that direction; but the great point he made was changing that food which medical men recommend. When that change of food was instituted, an immediate improvement occurred. I made an analysis once of infant foods; I had about eighteen of them; and the very best infant food that there is, is made in this city by Reed & Carnrick, the calcareous salts and other elements being so prominent that they will nourish every tissue in the body; but of course there is no food as good as cow's milk, if a child cannot have the natural food to supply the tissues. Before the first teeth have erupted, even in the uterus, it is then the child should have the proper foods. That is where our mistake is made; we do not commence early enough; we have not posted our patients where the trouble is, but we pound in a little tin and a little gold. There is nothing that will conduce to the salvation of the teeth more than proper food.

Dr. Hodson. This is a very old subject. I do not know when I have not been interested in it. In fact, twenty or more years ago I was completely infatuated with it and its possibilities. But my experience has been discouraging; and with the passing years I have lost interest, and indeed faith in it, being convinced that, though superficially the theory was correct, the premises being wrong it became valueless. About that time a very eminent surgeon in New York, with whom I was associated rather closely, instituted a series of highly scientific experiments, both in the laboratory and clinically, with the purpose of "feeding" these bone-building salts to the system, thinking that, by administering them directly as drugs, he would induce the system to take them up It was altogether, and a flat, failure. He found, upon analysis, that the entire amount administered was passed out of the system unchanged; and as time after time this result obtained, he grew thoroughly discouraged and threw up the whole matter; and the more readily, as he found the lime-salts *always present* in the excretions from the ordinary foods, from numberless analyses of them which he thereafter made.

I took a different ground, and about that time wrote a very exhaustive paper on the subject,—one over which I had thought a great deal,—in which I took the stand that the lime-salts in drug form were in a strictly mineral state, and consequently were not a pabulum for the system; that, in order to become such pabulum, they must have passed through either the animal or vegetable systems, or, preferably, both. So, my proposition was that they should be presented to the human system in the foods containing them most richly, like the whole grains of the cereals, and the products of animal bones, flesh, etc. ; and that, moreover, from our white flour being bolted so thoroughly, nearly all of the bone-builders were eliminated, as they lie exclusively in the outer coats of the cereal grains, and that there was left remaining but the valueless, for these purposes, white gluten of the interior. All these things I studied very carefully, even striving to put back into the white flour the elements lost, and so making unnecessary the employment of the "chicken feed," so distasteful and indigestible to those requiring it the most, by having my cook steep fresh wheat-bran in a small quantity of water for twenty-four hours, strain, and use the resulting clear liquor, instead of the water usually employed for wetting the flour, for the bread-making ; this is an excellent idea, by the way, for regular use. The bread is a rich, yellowish, appetizing shade, instead of pale white, as usual, has a real flavor, weighs more, and keeps moist longer.

To resume : I felt also that we did not go back far enough with our treatment ; that, the nutrition of the teeth being so very slight, we must go back to the time of their formation to get appreciable influence over their structural quality. So I fed the phosphate foods and grains to the mother during the period of gestation, and afterward during the nursing period, and to the child as soon as it could eat. The actual results of all this good theory were *nil*. My final discouraged deduction from these years of work and observation was that the difficulty *did not lie in alimentation at all*, the usual foods furnishing ample of the bone-builders, even leaving out the flour entirely, as was shown by their constant presence in the excretions, but that it lay entirely in *assimilation*. Therein lies the heart and essence of the whole matter.

If the assimilation be faulty, we cannot induce the system to accept and employ these lime-salts by *any* method of urging. No matter in what quantities or in what form we exhibit them, they will pass out of the system as they entered it.

Dr. Wm. Carr. I agree with Dr. Hodson that "this is an old subject," and concede the truth of his arguments as far as they go ; but I think there is a vital point which he, as well as the essayist, has overlooked,—namely, that the cause of imperfect development of children's teeth is largely due to insufficient open-air exercise, which is essential for the proper assimilation of food. The mental faculties of children of the present day are developed at the expense of the physical. Knowing that this subject was to be discussed at this meeting, I have examined the school-books and carefully noted the habits of children who have recently been in my office. I found that they studied many text-books, but had little time for open-air exercise. To illustrate this point : Two sisters, eleven and fifteen years of age, were studying arithmetic, spelling, geography, history, Latin, French, and German, the elder sister having the additional study of Greek. The open-air exercise of these girls consisted in walking to and from school. This certainly is not conducive to the proper assimilation of food.

Dr. C. G. Pease. I agree with the ideas expressed by the last speaker. If there is not a physiological ability of the tissues to appropriate the lime-salts, of course the food or the selection of it is of little service. There should be plenty of out-door exercise, oxygenating the blood, developing the muscular system, and inciting the organs to vital activity. There is a cause which may perhaps affect very materially the teeth, as well as the general physical condition of the child. It has been demonstrated very fully to my mind, in the experiments and discoveries of Dr. Pratt, of Chicago, during the past year, that in male children the foreskin is never retracted, causing constant irritation and diminishing or draining the sympathetic nervous system, which is responsible for the correct functions of the organs. I have had the privilege of being at Dr. Pratt's clinics, and I have seen the results of his treatment in those cases. Anything that will sap the sympathetic nervous system will deplete the health of the individual. I agree with the paper fully as far as it goes.

Dr. M. L. RHEIN. While agreeing very heartily with the essayist as to the necessity for devoting ourselves more thoroughly to the law of prevention, I must disagree entirely with the title of his paper, "The Law of Prevention *versus* the Law of Cure." Every statement which he made seemed to prove the fallacy of the position he took. If his paper had been entitled "A Combination of the Law of Prevention and the Law of Cure," I could have agreed very heartily and thoroughly with him. While I feel very much in sympathy with the strictures which he makes in regard to the number of men who are supposed to practice dentistry, and who do nothing but repair, instead of trying to prevent decay, I think there is a very respectable portion of the profession left who combine both things. It is not our field, at the present time, in this age, to idealize a condition of the millennium, which none of us ever expect to see; but it is our duty to take things as we find them, and do our best for the patients who intrust themselves to our care. It is certainly incumbent upon us to combine these two topics on which he spoke, and which to the essayist appear to oppose each other diametrically. I admit that the prevention of disease is far better than the cure of it; but when people come to us in a state of disease, in order to prevent further ravages of that disease it is absolutely necessary for us to place their mouths in such a condition that by pursuing the directions we give them they will be enabled to retain their teeth in a state of usefulness for the remainder of their lives. If that is to be done with the skill and care which is requisite to accomplish the desired end, it is not a thing which any mechanic can do with a few days' instruction. It is one of those arts for which a person must have the ability born within him to accomplish properly, and the very case which the doctor cited in his paper was a proof of this assertion. He spoke of some ignorant man whom he had seen practicing dentistry, who seemed to have some wonderful occult manner of knowing, without having been taught, how to fill a tooth so that it would be preserved forever; while, on the contrary, he cited the case of numerous men of education and of scientific attainments whom he found thoroughly incapable of doing the same operation.

I bring up these words in order to show that the art of preserving a tooth after it has once been attacked in such a way that its natural defence has been destroyed is not a little thing, but a mighty difficult thing, if performed as it should be.

In regard to the question of the prevention of decay or of disease in any form, the great misfortune with the majority of the profession is not that they do not understand the value of instructing their patients as to how they should prevent future trouble of the teeth, but the fear that the time it is necessary to take in order to do this will not be paid for. Their time is worth so many dollars to them, and it is necessary for them to earn those dollars. The mistake is in the manner in which they conduct their practice. It would not be so if they would show their patients that it is worth more to them to get valuable advice than material work. This is the point that we should learn, to charge our patients for advice even more than for work ; but it is the most difficult lesson for the profession to learn, and it is due to the old, antiquated idea of "so much for doing so much." Men should leave that position behind, and tell their patients frankly that this advice which they are giving, if followed out, is worth more than any filling or other work which by manual labor they can possibly do for them. If they are patients worth having, they will gladly pay for it.

In regard to the question of improper diet injuriously affecting the teeth, while it is well taken, we must not overlook other causes. The point brought up about the extreme use of the nervous energies is a very well taken one, and it applies equally well through the whole category of infractions of the law of human nature. It devolves upon us, when we see people, to discover what laws they are violating, so as to advise them properly. In regard to increasing the density and value of children's teeth that are not in proper shape, you may give them all the whole-grain food you want, but if you allow them to eat it as many do, it is of no value. They will suffer from a lack of assimilation. The greatest cause for this lack of assimilation in the food of children is that it does not receive the proper amount of contact with saliva in the mouth. I make the assertion that the greatest benefit is to be obtained from the exercise of the teeth. I do not believe that all the grinding possible of the teeth on food can wear them down ; on the contrary, the jaws and teeth are part of the human body, and the same laws that govern the rest of the body govern them. The more you exercise your arm, the better condition it will be in, and the same thing holds good with regard to the jaw. The exercise of the jaw and the teeth in mastication is bound to improve their condition. I want to say a word of caution in regard to the habit of allowing children to drink during their meals or while they are eating. It is one of the common rules that I give my patients, to forbid their children taking any liquids while partaking of food, but to confine the taking of liquids to before and after the meal.

Dr. LOUIS C. LEROY. I would like to have it go on record that another factor causing dental caries is the extreme thermal changes due to the cultivated tastes of civilization, requiring hot preparations, followed by cold ones, and alternating in that way. I think this is responsible for many of the conditions which we are called upon to treat.

Dr. S. G. PERRY. If Dr. John Allen were alive, he would say, "I told you so." There is a great deal to commend in the paper and the spirit in which it is presented, but it does not for a moment convince me that decay of the teeth is due to the use of white bread.

Nor is it due to the use of salt, as Dr. Brown intimated. An old lady, who was afflicted with many diseases, when asked by her friends what was the matter, said she guessed she had the "complication." I am inclined to think the cause of decay is the result of complication. I have heard Dr. Hodson make many wise remarks, but none wiser than he made to-night. I think ordinary food contains all the elements necessary for the development of the body, and for the development of all the organs of the body, in a perfectly natural and sufficient manner if there can be reasonable assimilation. Quite a number of factors have been mentioned. Some of them are rather far-fetched. As exercise has been spoken of, I think the wheel might be mentioned as a help for strengthening the system, circulating the blood, and strengthening the muscles, and getting the system into such a condition that the excretions will be as they should be, the impurities passing through the skin as well as through the great eliminating organs of the body. It would take a long time to tell what brings about the decay of the teeth, and a long time to tell what would save them. I do not believe that talking to patients amounts to very much. What you say goes in one ear and out of the other. I am not sure but that is what the other ear is for. It is an advantage, sometimes, for a great deal goes out that is better lost than retained.

Dr. Stowell. In answer to Dr. Brown's remarks, I would say that his savages subsist largely on roots and herbs, which contain sand, and which grinds down their teeth. A year ago to-night, I read a paper on the influence of exercise on the teeth, and then stated that many of our children were rushed through their studies and their school work to such an extent as to impair their general health, and thereby influence the teeth. In that paper I also mentioned that upon exercise depended, to a very great extent, the permanency of the teeth, by the selection of foods which require mastication, as well as containing the necessary elements for nutrition. It has been said that absolute cleanliness of the teeth will prevent decay. While theoretically that may be true, practically it is impossible.

In regard to Dr. Rhein's statement, I will read two or three lines of my paper, which I will not take back. "I have seen as good gold fillings as I ever saw, inserted in teeth by a man wholly ignorant of the science of dentistry, who seemed to possess an occult conception of the mechanical principles of the art. That we are useful men and that our repair shops are a necessity, I will not attempt to deny."

One very interesting case which was to me an entirely new observation I would like to present. After the publication of my paper a year ago, one of my patients who saw it became thoroughly convinced of the merits of the subject. She had been a great pastry eater, but she abandoned it entirely and banished it from her household, and has subsisted for nine or ten months upon entire wheat, the educator crackers, and such foods. As far as cereals are concerned, they were her only food. More than a year ago, while a patient of mine, she called my attention to her finger-nails, which were as thin as wafers and very sore. She asked me if I knew anything about finger-nails, and I said I thought they were not getting enough "finger-nail timber," that is, proper food. She called upon me a short time ago and showed me her nails. A little groove on the top showed that a new growth had taken place, and that they were ample in thickness and strength. The suggestion at once came to my mind that it was due to her change of diet.

Another case, the details of which I could produce, was that of an enthusiastic scientist, who experimented with Italian laborers who subsisted almost entirely on black bread, which is made from the entire wheat. The Italians were engaged in digging a trench, and, during their meal hour, would eat their roll of black bread and take some water, and work like horses all day. This scientist furnished them with entire white bread, free of charge, and the Italians seeing an opportunity for economy accepted the white bread and brought it to their work and ate of it daily, until gradually, one by one, they dropped out and went to their houses for repairs. At the end of two or three weeks, more than half of the laborers were unable to work. Then the scientist restored their black bread, and soon they were able to perform their work as before, showing that it was impossible for them to subsist on a bread which contained only one-fourth of the nutrients which they had formerly eaten. Although he had made no observations upon that occasion in regard to the teeth, it shows the powerful influence on the body of a one-sided diet.

A unanimous vote of thanks was offered to the essayist.

B. C. NASH, *Secretary.*

UNION CONVENTION OF THE SIXTH, SEVENTH, AND EIGHTH DISTRICT DENTAL SOCIETIES OF THE STATE OF NEW YORK.

(Continued from vol. xxxvii, page 1052.)

SECOND DAY—*Morning Session* (Continued).

DR. S. B. PALMER read the following paper:

DENTAL SCIENCE, THEN AND NOW.

At no time in the history of dental science has the subject of operative dentistry claimed the attention of the profession more than it does to-day. In 1839 the first dental periodical in the world was issued, entitled the *American Journal of Dental Science*. *Then*, little was known of true dental science. Etiology of dental caries, and filling teeth, have been themes for discussion until *now*, with flattering success, and fond hopes that operative dentistry was about to be placed upon a scientific basis. That is, we have taught that undeveloped teeth, like those of children which need fillings at twelve years of age, are so lacking in mineral elements as to render the dentine a conductor of thermal changes and electric currents; that nature's process of calcification is reversed, not only to cease adding to, but in some cases to take from, the lime-salts already furnished. That is to say, that vital force is an agent active in highly organized teeth to hasten decay around metal fillings (gold in particular); even more, to withdraw or absorb lime-salts, to the devitalization of dentine, enlargement of cavities, and loss of fillings. The May issue of the DENTAL COSMOS contains an article in which all that has been claimed for dental progress up to now is considered a mistake, and we are astonished to find, according to that, there is no recognized law to govern a young graduate in the selection and adaptation of filling-materials to conditions of the teeth. Quotation from COSMOS: "There is no basis for the selection and adaptation of filling-materials to soft teeth, hard teeth, frail teeth (in structure), or poorly calcified teeth." I will further quote from the conclusions given in the article, to show that there is occasion for this writing. As the writer is held responsible for the introduction of the theory which has often been declared to have no foundation in science, he feels it due the profession to know that the electro-chemical theory of dental caries has not been discussed upon the plane of animal existence, but upon the physical or chemical plane, and that figures have been produced upon the latter plane which in that relation are correct, are made to apply to all the conditions relating to the subject, ignoring the basis upon which the vital theory is founded. Thus the confusion which has attended the discussion thus far. The following is quoted: "Caries of the teeth is not dependent upon any condition of the tissue of the teeth, but upon conditions of their environment." In this the vital principle is denied.

Again: "The objects to be attained in filling teeth are the perfect exclusion of the causes of caries from the tissues by sealing the cavity and securing such form as will prevent lodgment of *débris* about the margins of the filling, and thus prevent the further action of the causes of caries." Here, too, the vital action of the pulp through the tissue is not counted a factor. Please bear this in mind. And again: "There is no basis for the supposition that some teeth are too soft, or too poorly calcified, to bear filling with gold or other metal in use for that purpose, since all are found to be abundantly strong."

Once more: "With our present knowledge, the only basis for the selection and adaptation of filling-materials to classes of cases is the individual operator's judgment as to which he can so manipulate as to make most perfect filling, considering the circumstances, his own skill, and the durability of materials."

This brings operative dentistry back to the starting-point of discussion, twenty years ago. Not so with practice: no amount of figuring can set practice back a single year. I regret that this crisis has been forced upon us. From the first we have done all things possible to prevent it. Reconciliation has been impossible. No quarter has been shown, and, according to late writings, the electrical theory is denied recognition.

Notwithstanding all this, its scientific principles remain with an increasing practical backing.

We are discussing science, and we might as reasonably expect a collision of planets as to be told by scientists that figures proved contrary results upon definite points of investigation. Science is a revelation from the Creator, to the understanding of man, through matter and natural laws. The figures which have been given, and which are supposed to annihilate the electrical theory, are based upon the *physical plane.* The electrical theory and the matter under consideration is based upon *two planes above*, which is the kingdom of vital existence. There is no connection of the laws and forces between the two planes, except as they have been modified in their evolution from mineral compounds up to organized tissue. Every effort has been put forth to crush out the electrical theory, mostly by pointed denials stating that it is not scientific, and that there is no ground for it to rest upon. The last and conclusive contact seems unaccountable, but not unanswerable. It must have been an oversight. I cannot believe that it was intentional to mislead. Figures which are correct upon one plane have been used to overthrow a theory which has no relation to the conditions under which the figures were obtained. Following this, without discovering the misapplication, the *Dental Practitioner and Advertiser*, after quoting conclusions from the COSMOS, triumphantly adds: "Now what do our advocates of 'plastics for poorly calcified teeth' and 'gold only in teeth above the average in structure' propose to do with these figures? They cannot be ignored, and must be met." "The conclusions of their author regarding the 'adaptability' of filling-materials, the proper 'electrical conditions,' and 'tooth compatibility' are expressed as follows:

"'There must be a general abandonment of the idea that the teeth of any patient are so lacking in density as to interfere with any of the materials now in use.'

"And these conclusions came from a man who has made more real scientific experiment to determine the truth than all the advocates of the 'compatibility' theories have ever performed, or would perform in a hundred years, if their average for the past decade is to be maintained.

"What is to be done with these demoralizing figures? How are these confoundedly annoying demonstrations to be buried? They interfere with our 'personal comfort.' The paper was published in May last. Up to this writing there has been no response. Are we all paralyzed? Is there no chance for squelching this modern disturber of Israel? Must we have forced down our throats the unpalatable charge that the failure of our operations is due to our own carelessness or incompetence? If so, Heaven save us from ourselves." "There is enough in the above to fill our pipes for a good long smoke, and it is hoped that the fumigation will soon begin."

The above editorial is given in spirit and language well calculated to provoke controversy, rather than to preserve harmony. To answer the questions accordingly would not dignify a scientific discussion. To answer in brief:

"What do our advocates of plastics propose to do with these figures? They cannot be ignored, and must be met." They should not be ignored. They relate to inert matter, and in that connection they are correct and admitted. They will not be met with a collision as desired, but will quietly pass by upon the freight track as inert matter. "How are these confoundedly annoying demonstrations to be buried? They interfere sadly with our personal comfort." We answer, Bury them with the hatchet which has caused the discomfort, and there will be no more annoyance. It says, "The paper was published in May last. Up to this writing there has been no response. Are we all paralyzed?" Far from it. The trial against the electrical theory has been pushed for twenty years. It was summed up in the May COSMOS, and we have waited until the *Practitioner* calls for a response. In substance, Have you anything to say why sentence of banishment from operative dentistry should not be pronounced upon the electric theory?

We beg leave to prove that the case has not been tried under the laws relating to it, and will go back to the first principles of matter which relate to elements, there establish primary laws and forces, and carry them forward and up through the changes until they appear in vital tissue, on the plane of animal existence, where the case will be opened for a new trial. So far as books and authority go, we will use the best, and will quote from "The Conservation of Energy," by Balfour Stewart, LL.D., F.R.S., Professor of Natural Philosophy at the Queen's College, Manchester, England. "There are four planes of material existence, which may be represented as raised one above the other. These are, (1) the plane of elementary existence; (2) the plane of chemical compounds, or mineral kingdom; (3) the plane of vegetable existence; and (4), the plane of animal existence. Their relations to one another are truly expressed by writing them one above the other, thus:

4. Animal.
3. Vegetable.
2. Mineral.
1. Elements.

Now, it is a remarkable fact that there is a special force whose function is to raise matter from each plane to the plane above, and to execute movements on the latter. Thus it is the function of chemical affinity alone to raise matter from plane No. 1 to No. 2, as well as to execute all the movements back and forth by action and reaction; in a word, to produce all the phenomena on No. 2, which together constitutes the science of chemistry.

It is the prerogative of the vegetable life force alone to lift matter from No. 2 to No. 3, as well as to execute all the movements on that plane, which together constitute the science of vegetable physiology. It is the prerogative of animal life force alone to lift matter from No. 3 to No. 4, and to preside over the movements on this plane, which together constitute the science of animal physiology. But there is no force of nature capable of raising matter at once from No. 1 to No. 3, or from No. 2 to No. 4, without stopping to receive an accession of force of a different kind on the intermediate plane. Plants cannot feed upon elements, but only on chemical compounds; and animals cannot feed on minerals, but only upon vegetables, or that which has been raised above vegetables.

These facts have not been considered in the conclusions, as all are based upon the physical plane. Let us follow the laws up from one plane to another, and see the changes there are in matter as we ascend. Chemical force unites elements, and chemical compounds are the results, which embrace everything below organic compounds. This is the physical plane. Here we are taught physics, chemistry, and electrolysis, as well as other forces, cohesion, chemical affinity, etc. The principles taught by the galvanic battery and its current, and the electro-plating bath, we take up to the plane No. 3, vegetable physiology. Vital force touches chemical compounds, and vegetation springs up from the lichen to the mighty forest trees, with all intermediate productions calculated to support animal life. The galvanic battery also has been organized. One pole has been located in the foliage, and the other in the rootlets of the tree or plant, and a to and fro current passes through the stem or trunk, while the plating fluid from the plane below is the sap which contains all the organized elements requisite for the growth of the vegetable.

Again, vital force comes from above, and touches organized matter; animal life appears from microbes to man, to whom is given will power. Man is a cosmos. The body contains organs, conductors, currents, elements, nutrition, and vital intelligence, sufficient to care for each and every part of the body, to build or take down any of its tissue. To bring up our variable laws from the vegetable plane, foliage reappears in *lungs* for breathing, digesting of minerals by chemical action of the rootlets appears in the stomach. The sap appears as blood, which contains all the material needed for growth and support of the system. Each organ is endowed with intelligence and force to convey material to and from points under its supervision. The oral cavity is the reception room where food is ground, insalivated, and prepared for the stomach. The oral cavity is the only vital laboratory in which chemists are allowed to work, and the only instance where scientists insist upon vital tissue living upon elementary food. This is done when sensitive teeth are filled with gold without protection.

Vital currents act upon organic matter, on the blood, or secretions the same as physical currents do upon metals in plating, as it is known that the reversal of a current undoes the plating and transfers it to the negative pole, which before was positive.

So thought influences these currents. Thought causes blood to fill the brain, shame brings flush to the face. The thought of eating a lemon causes the saliva to flow, to neutralize the anticipated acid, etc. Exposure of the body to cold, the change of a collar, cutting of the hair, sitting in a draught, etc., is often the occasion of a cold. This is merely the reversal of the vital current, which brings the exposed parts to an abnormal condition. When an undeveloped tooth, that is, one not fully calcified, is filled while sensitive, the same reversal takes place.

In teeth there are two conditions, attended with different results. When teeth have received sufficient lime-salts to render the dentine a non-electrolyte or a non-conductor of thermal changes, this occurs; the surface of dentine in contact with the metal becomes inert matter, and serves as a protector of the vital tissue. The vital force in tissue works up to the dead line, to complete calcification, as it would against enamel.

When the dentine is poorly calcified, devitalization goes deeper; there not being sufficient mineral matter to protect the organic, the latter decays. Nature does not repair or resist the encroachment of decaying tissue, and quite frequently the pulp takes back lime-salts from dentine beneath gold fillings which seem perfect, and which have done service for years, when inflammation of the pulp demands removal of the filling, and it is found that only the organic portion remains as a protection. I have seen cases where all the teeth were breaking down from this reversal of the vital current. While I have not recommended the heroic treatment, there are cases where devitalization of the pulp would correct the difficulty. This derangement of nutrition is manifest in several ways. Change of climate, long sea voyages, etc., are evidences of the same principle. Ptyalism from effects of mercury is a manifestation of systematic polarity. Nature disapproves of an element.

Let us apply this principle to the absorption of the roots of deciduous teeth, which is a vital process. By pressure directly upon the end of the root, the current is reversed and the material is taken away, or from one side of the root where the pressure is in that direction. The surgeon bandages a limb or part, to cause absorption. Iodin is used for the same purpose.

Thus it may be seen that a gold filling, in contact with highly organized dentine, strikes a chill to the tissue by a breath of cold air, or cold food, or cold drinks. In young teeth, lime-salts seem to be withdrawn, and caries follows. Time forbids touching practice or proving statements by practice. I will only add that gold may be adapted to the conditions of poorly calcified teeth by insulation, by the use of chloro-balsam, paraffin, etc., which exclude moisture, prevent thermal change, and allow nature to proceed with calcification. This is the adaptation of materials to conditions.

Gentlemen, the doctrines which we have set forth are not of modern discovery, as may be seen by the closing sentence of a paper which I read more than a score of years ago: "What I have presented may not be new to you. To me, much of this knowledge is the teaching of a 'still small voice,' communicated through the magnetic needle,—an expression of a force manifest in heat, light, motion, magnetism, electricity, chemical affinity, life, and the imagination adds Divinity." It had required years of observation and study to obtain the principles given in that early day. Of one thing I am certain, and that is, that this advance doctrine could not have come from any other profession or occupation but dentistry. The oral cavity is the only laboratory where minerals and metals are daily brought in contact with vital tissue, and my excuse for the persistence in bringing this matter before the profession is, that circumstances placed me in a way to gain just this knowledge, which perhaps has never been forced upon another, and which I believe it is my duty to give the profession.

In 1847 I commenced wearing a silver plate upon which were mounted nine teeth. Having previously become somewhat acquainted with galvanism and electricity from private study, my study of oral electricity began with the wearing of the plate. I soon learned that foods of various kinds produced galvanic currents, disagreeable or otherwise, but still unnatural. Sulfur in eggs, the smoke of gunpowder, which, in addition to sulfur, contained carbon and niter, was quite as perceptible by taste as by odor ; the same in breathing through the mouth, near sulfur springs. Carbon while it is yet vegetable, as in coffee roasted, broiled meat, bread toasted, griddle-cakes, etc., all communicated to the plate and gave a metallic taste. Nor was this all taste, but a sensation communicated through the metal, disagreeable in silver, natural in gold, lacking always in rubber.

Another lesson was to allow the surface to become oxidized or sulfurated, which almost overcame the action. This was a help to patients, as rubber was not then in use. In time gold was substituted for the silver plate, which was a decided improvement over the latter. Gold being a negative element, the action was changed from the plate to the positive elements in contact with it. Gold becomes charged with electricity during contact with food which is positive or easily decomposed. The greatest objection to gold dentures, as formerly made, was the difficulty in cleansing ; such plates should not be worn. The next experiment was with rubber, which was very unsatisfactory on account of heat, being a non-conductor, which also prevents taste, much more than metals. These are points to be gained by actual study, by comparison in the mouth. My observation led me to conclude that there was no difference between red and black rubber on account of non-conductivity, which is the main cause of spongy gums. Then came aluminum swaged plate, with rubber mountings, which is by far the most comfortable and natural-feeling plate I have worn. Cast aluminum had a more severe trial, as it came in contact with two bridges worn below, occluding with the aluminum caps which covered a molar on either side for the purpose of increasing the bite. The plate was inserted, and I noticed a metallic taste, but thought it might pass away. On going upon the street in the evening, I noticed that all the lights were remarkably unsteady, annoyingly so, but soon learned that it was caused by closing the jaws. The shock, which I had not noticed before, became visible or perceptible through the optic nerve. The gold, as it does in all mouths, stands at a potential higher than the positive elements in the mouth. On closing the circuit, the running-down of the potential caused the twitching of the nerve, and thus the apparent flickering of the lights. Removing the caps and substituting rubber corrected the trouble. Still, cast aluminum worn with gold gives more galvanic action than rolled plates. I know that it is not right to wear an upper and a lower plate of different metals, except gold and platinum. Many experiments have been made that no one not engaged in the study would have thought of. A molar which was clasped with gold had a coronal cavity nearly in the center. This was filled several times ; being surrounded with sound enamel, there was no danger of decay. A gold filling produced no sensation when the tongue bridged from filling to clasp, or when it came between the bridge below and the filling. An amalgam filling gave a decided current. Copper amalgam was tested, and for a time was altogether the most disagreeable ; but in a few months it turned black and became tasteless. This filling was all right when the tooth was extracted ; on account of absorption of socket it was clasped, and supported a plate forty-one years. The above are some of the lessons learned from nature direct, and to me have become so scientifically correct that no figures upon experiments made on the chemical or second plane can set them aside. They amount to positive knowledge.

Now, let us take a stand upon the vital plane No. 4, where operative dentistry belongs, so far as the treatment of normal vital teeth is concerned. And here we have only kind words for "this modern disturber of Israel." As the article states, the investigations relate to the physical properties of the teeth, and are as correct as it is possible to obtain. The vital principle of the teeth seems to be ignored, as the quotation shows. "Caries of the teeth is not dependent upon any condition of the tissues of the teeth, but upon the conditions o their environment." When teeth are extracted, that moment they become inert matter and belong to the physical or chemical plane. Crowns of pulpless teeth in the mouth, and those that have done receiving nourishment from the pulp, also come under the line of investigation so laboriously performed and scientifically set forth. All other teeth from infancy to old age are vital organs in proportion as they receive vital support and circulation, and they belong to the fourth plane. From first to last investigators have left this vital distinction out, and, by making the laws which are limited to the physical plane cover the whole ground, leaving nothing for the vital principle to stand upon. The motive for doing this I cannot discover. The greatest mystery is that it is done by the acknowledged leaders in the profession. This is the part that I most regret after having failed to have this oversight corrected, so as to preserve harmony. A crisis has been reached, and we were compelled to make the above statement. We remained silent, and the taunting question was put: "Are we all paralyzed? Is there no squelching this modern disturber of Israel?" If these conclusions gave us any practical benefits above our present attainments, it would be to an advantage; but no, as has been previously stated, the object has been to show the fallacy of the teachings which are followed by many operators.

Please note the principles we claim as beneficial to operative dentistry upon the animal plane. Trusting that the distinction has been plainly given, we will deal only with teeth in a condition in which they are nourished by vital forces through the pulp or pericementum. Since the age of twelve years has been mentioned, let us take the average teeth in that condition, which will also apply to any age according to their vitality. The first conclusion we notice is this: "There is no basis for the supposition that some teeth are too soft or too poorly calcified to bear filling with gold or other metal in use for that purpose, since all are found to be abundantly strong." Again: "There is no basis for the selection and adaptation of filling-materials to soft teeth. With our present knowledge, the only basis for the selection and adaptation of filling-materials is the operator's judgment as to which he can most perfectly manipulate."

In answer to the above, I think that the majority of operators will call such teeth soft and poorly calcified. We will still use those terms upon the vital plane. It is impossible for me to harmonize the conclusion that there is no basis for the selection and adaptation of the filling-materials, etc. "With our present knowledge, the only basis for the selection and adaptation of filling-materials is the operator's judgment as to which he can the most perfectly manipulate." This is the hardest blow ever dealt to dental progress. It admits that operative dentistry is not a science, that there are no known laws by which to adapt filling-materials to the conditions of the teeth. It gives license to the young graduate to gratify the highest ambition of every enterprising young operator, to do gold filling whenever a tooth would seem to stand the operation, only to find to his sorrow and to the patient's loss that a mistake had been made.

Twenty-five years' experience on the Dental Examining Board for the Dental Society of the State of New York, and sixteen years of registration for six counties in the state, have afforded knowledge of the teachings of various colleges throughout the state, as well as the understanding of graduates bearing upon this subject. With the schools, as with practice, there has been evolution. At first but a single college ventured to brave the criticism resulting from the teaching of this heretical doctrine. Others have cautiously taught liberal ideas as practice led and gave support. Notwithstanding, if graduates can be relied upon, many schools are impressing their students with the falsity of the electric theory.

The most charitable allowance for opposition by investigators would be that they do not comprehend the laws and forces upon the plane of vital activity. This seems evident from the fact that the author of the article twice alludes to constitutional causes, but in a manner to act upon the environments of the teeth through saliva rather than from within, when, in fact, both agencies are at work at the same time. I believe that if the author had made his investigations from the chemical standpoint, together with the electro-vital experiences which have been forced upon the writer, operative dentistry would now be standing upon a scientific basis, and dental schools would be teaching laws and principles which would enable graduates to see the end from the beginning of their operations, rather than to be told to rely upon their own judgment, without experience to guide them ; which would be a decided gain over the claims of the author, quoted as follows :

"The greatest good that I could expect to come from this laborious investigation (except as it may affect the future study of the caries of the teeth) would be the general abandonment of the idea that the teeth of any patient are so lacking in density as to interfere with reasonable filling-operations, with any of the materials now in use." Thus the effect seems to have been put forth to destroy a theory without substitution. It seems time now that the coming investigators who have been watching the outcome of the electric theory, the microbic theory, the physical theory, come to the front, and do some independent thinking for themselves and the profession. I am positive that great good will grow out of this occasion.

To recapitulate. Chemical force raises elements to the second plane, which is the plane of chemical compounds under the control of physical laws and forces. Vital force raises chemical compounds to the third plane, which is the vegetable kingdom. In this kingdom the matter is organic, and is under control of vital forces which act upon organic matter upon this plane. From the third plane animal force raises organized forces up the fourth plane, which is the plane of animal physiology. Man stands upon this plane, a cosmos. In him are incarnated all the elements and forces found in the body. All have been lifted up by a force or power from the plane above. Man has vitality, thought, will, sensibility, and action. These endowments control his system, and the various organs of the body perform their function under vital direction, involuntary or voluntary, as the occasion or circumstances demand. All the matter in the body proper, or the food which supports it, has been so organized as to be under vital control.

Here we search our book in vain for further knowledge, and here too investigators bring up physical forces from the chemical plane, and by them condemn vital action.

To illustrate. Many years ago the highest recognized dental authority in the world proved to the profession that a tooth was not an electrolyte, because it is a non-conductor and could not be injured by a gold filling, and that settled the matter for all subsequent investigators. Now comes up an array of figures from the same plane, and the conclusion from their teachings seems to have settled the annoying question in the mind of another defender of operative dentistry against heretical doctrines, and he exultingly remarks, "Are we all paralyzed? Is there no chance for squelching this modern disturber of Israel?" Could he have forgotten that "there is a God in Israel?" I know in whom and in what I have trusted, and regard this as the brightest day in the history of operative dentistry.

We again call up the human body and apply our organized laws and forces to the teeth, and to be charitable will divide with opponents of our theory, giving the latter all teeth that have been extracted, pulpless teeth in the mouth, as well as those which, for any cause, either by age or abnormality, have lost vitality or pulp-nourishment. This class belongs to the second, or physical plane, upon which the experiments were conducted, and with which they agree in the main with the conclusions as claimed by the figures. The other class includes the vital organs in which the pulp and the tissue are in a normal conition.

To abbreviate, I will take for an illustration the teeth of a child, although the same principle applies to all this class of teeth according to their organic construction. Each tooth is a vital body, a part of the whole system. It has a pulp which is supplied with materials to furnish the tissue with all that is required to make a normal tooth. It also has vital force like other members of the body which take the material to and from the parts according as vital energy directs. We understand that an exposure of even a small portion of the body will produce a cold, perhaps neuralgia, which is a reversal of the vital current, causing an abnormal condition.

We should understand that a metal filling, when placed in contact with vital tissue, also reverses the current. Nature will not convey lime-salts to a point of contact with metal. There will be a lamina of dead matter in thickness according to the conductivity of the dead tissue. In normal dentine, and even in that more highly organized, this devitalized lining will prove a protection, and the process of calcification will go on under the cover; but when the organic matter is so great as to allow fluid circulation, chemical action ensues, and caries is the result. The tissue becomes an electrolyte under the laws governing the action upon the vital plane. What is understood by the adaptation of filling-materials to the condition of the teeth is this:

Nature will not tolerate the repeated shocks of thermal changes produced by metal in the teeth where lime-salts are being deposited. Plates may be worn, or crowns upon roots, in which case there is no calcific process going on; but thermal changes produce an abnormal condition, with results as described.

When there is a liability that such changes will take place, a non-conducting filling like gutta-percha, a lining of chloro-percha, chloro-balsam, or some oxid will allow the process of calcification to proceed. This is the adaptation which is rejected. Not only does this principle apply to the teeth, but to the whole system. Constitutional effects of mercury change the natural potential of the system, and ptyalism is the result. The whole secretions become changed. Change of climate, altitude, sea air, etc., all come under the same laws for benefits or injuries according to conditions.

There can be no progress in etiology of dental caries so long as investigations are based upon the physical plane. The study must be conducted by observation of vital forces upon matter, the plane where man "lives, moves, and has his being." Then there will be harmony with cause and effect. Then we can understand how vital force controls organized matter. Also, that constitutional change through vital circulation in the tissues is as truly a dyscrasia as gout or rheumatism.

Discussion.

Dr. W. C. Barrett, of Buffalo, in opening the discussion, regretted that the paper took the tone which it assumes. He felt that no element of personality should enter into the consideration of the subject, but that it should be discussed upon its merits. The observations of Dr. Black were the most careful and the most exhaustive that had ever been carried through in the domain of dentistry, with the possible exception of Dr. Miller's. Dr. Black invented complicated and scientifically accurate apparatus for these experiments, and his results seem conclusive and must be met by equally positive testimony. Any number of plausible theories will fail to upset proven facts. If the theories do not agree with the facts, they must be abandoned. He had not expressed an acceptance of Dr. Black's demonstrations, but was disturbed by them. He had corresponded with different men, and asked what should be done about them. Is Dr. Black wrong? if so, wherein is he wrong? His experiments are detailed plainly, and if they are faulty, the fault should be pointed out.

All the data are carefully and minutely recorded, so that any one may trace out each step for himself, and verify or disprove the results claimed. In the face of such scientifically conducted investigations, mere contradictory generalizations cannot stand. He was free to say that the conclusions arrived at by Dr. Black do not agree with his clinical experience, but the latter has so many chances for mistake and error that he was unwilling to put it in the balance against such positive demonstrations as those of Dr. Black. What he is seeking is to know where the mistake is, but that should be demonstrated and not merely asserted.

Dr. Palmer's theories are not conclusive. He says that Dr. Black's deductions are faulty because the vital action of the pulp through the tissues is ignored. It is not ignored; the points are brought out just as they really are, and the conclusion is about this: As advancing age goes on, there is continually calcification in the teeth. Hundreds and hundreds of experiments are detailed, and they show and seem to prove that, taking all teeth, good, bad, and indifferent, there is no material difference between the same teeth in different mouths at the same age; that is to say, between those of your patient whose teeth melt down like snow before the summer sun, and those of a person whose teeth never needed any attention, there is absolutely no difference in the amount of lime-salts present. This is what he says. He does not ignore vitality, but says there is no difference in the calcific portion, but the variation is in the environment of the tooth, and in the vitality. The theory that has heretofore been taught is that the difference is in the teeth themselves,—in their calcification. He demanded that those who would uphold this theory should demonstrate it, as Dr. Black has proved by demonstration what he asserts. He could not think Dr. Palmer is correct when he says, "This sweeps away all that can be called scientific dentistry." If what we have taught has been a lie or an error, we should wish it swept away, and scientific dentistry demands that it should be swept away. If we would establish our doctrines, we must absolutely prove that they are based upon demonstrable scientific laws. He wished only that the truth should be shown; there was no personal feeling about it, and there could not be in any one who was seeking after scientific verity. The point is, What is to be done with those confounding demonstrations of Dr. Black which oppose our theories and which apparently cannot be disproved? He was glad such a paper had been read. He had purposely provoked it by challenging a discussion. He thought it was incumbent on those who maintained the doctrine of the incompatibility of certain filling-materials, and who years ago had invoked criticism by a bold defiance of the accepted practice, now to answer these demonstrations by others as conclusive, that we who are seeking light may have our understandings illuminated. But he disclaimed in the most earnest manner any intentions to flout or jeer, or be offensive in any way. He was sorry that his friend of thirty years seemed to take his good-natured badinage so much to heart, for it was to Dr. Palmer that he turned in his perplexity for an answer to that which was causing his uncertainty.

Dr. F. W. Low. In going through the forest we observe the lichens which attack and destroy the substance of the trees, but did any one ever observe the lichens upon a healthy tree? They only attack branches which are dead. So it is with the micro-organisms of the mouth; they cannot destroy a sound tooth. Dr. Palmer is right; those forces which we recognize in lower forms of matter as chemical forces are still chemical forces and galvanism in the higher forms of organism. A man who destroys a religious belief should be prepared to set up a better, and Dr. Black having attacked his dental religion should explain what every one knows, viz, that there are teeth which we find in our practice which are of low quality, that our judgment tells us will not stand the pressure of the insertion of a gold filling, and must be filled with material such as we think adapted to their quality.

Dr. R. H. Hofheinz said that Dr. Low was mistaken about there being no micro-organisms on healthy teeth. If he would examine any such teeth he would find them in plenty.

Dr. Low said that the micro-organisms, though present on healthy teeth, could not attack them to cause caries.

Dr. C. S. Butler considered the questions raised by Dr. Black's articles of very serious importance to the profession. The conclusions drawn from the experiments of Dr. Black had disturbed him, and he revolved them in his mind till he felt like taking them up and reviewing them in a paper before the convention. They are as startling as the theory of immediate root-filling was at first, but we have lived to see immediate root-filling generally practiced; so we may be obliged in time to agree with these conclusions. The principal point in Dr. Black's paper was not so much the vital force as the compatibility of all filling-materials with all classes of teeth. He had always felt and still feels that Dr. Flagg expressed the truth when he said, "In proportion as a tooth needs saving, gold is the worst material for use." It seems impossible to dispute the fact that the vital principle has much to do with the preservation of the teeth. We know that when the teeth of old people are worn down there is a deposition of an osseous nature which protects the pulp. This is an effort for preservation brought about by the vital forces of the tooth.

If we are to take up the question of materials, the testimony would be practically unanimous that experience does show a difference to exist in the results from the use of different materials in different teeth. We find, for instance, that gold is not adapted for use in the teeth of young people. In a large majority of cases in such teeth a gold filling would not answer as well as in a more fully calcified tooth. He regretted that he had had no opportunity to look the paper over before the meeting, but as far as this point went he was sure that the selection of filling-materials for the different cases was important.

Dr. F. W. Low asked Dr. Barrett if Dr. Miller did not demonstrate the deposition of lime-salts under a filling, and whether this, if true, would not disprove Dr. Black's theory that there was not possible change in the density of teeth by reason of change in health conditions.

Dr. BARRETT. Let us first be clear between facts and deductions. The facts set forth in Dr. Black's papers are indisputable; his deductions may be questioned. He says that vitality has nothing to do with the breaking down of the teeth. He claims that deposit of secondary dentine will save teeth, and shows that there is a progression in the deposition of dentine. These questions would need much more study than they had yet received before they could be accepted and be allowed to re-cast our theories and methods of practice.

Discussion closed, and convention adjourned till 2 P.M.

SECOND DAY—*Afternoon Session.*

The convention was called to order at 2.30, and Dr. E. J. HAUSLE, of Buffalo, read a paper, of which an abstract follows, on—

COCAIN.

The author gave a historical account of the use of Erythroxylon coca by the early Peruvians, and the ill effects produced upon them by the habitual use of the drug.

The process of gathering the drug and manufacture of the alkaloid cocain were next described in detail. Concerning his practical experience with cocain the author said,—

In excavating cavities I have had little success with the hydrochlorate in allaying pain, but the citrate gave gratifying results when used in one-fifteenth of a grain, although the sensation at first was of a stinging character.

For painless extraction I have tried the citrate and the oleate, but without success; and to me the only sure way is the use of the hydrochlorate hypodermically. The way the solutions are generally prepared seems almost criminal to me, as we have no knowledge whatever of what strength we are using. For instance, if we wish to use a four per cent. solution, eighteen grains of the salt are placed in an ounce bottle, which is then filled with water, accuracy being thus utterly disregarded.

Many times we hear complaints that cocain did not in any way lessen the pain of extraction, and the drug is condemned on that account. I have found that from two to four minutes should elapse between injection and extraction to obtain the best results.

During the past six years I have used cocain in my practice extensively, with both gratifying and alarming results. It is claimed by some writers that two-fifths of a grain injected hypodermically will not produce the desired result, but in a few of my cases two-fifths, and even one-fifth, of a grain have given results which perhaps were not desired, owing to their alarming symptoms.

My first experience in this line was some five years ago, when I was requested to extract a root for a married lady. The gum was cleansed of all deposits by a solution of boracic acid, and then one-fifth of a grain of cocain injected on both sides of the root; immediately there was a collapse of the system, the skin became cold and moist, respiration almost suspended, and pulse feeble; all consciousness seemed lost.

Another patient, a young lady of eighteen, received one-fifth of a grain, injected around the gums to relieve the pain of setting a crown. Immediately she lost consciousness, pulse became erratic, at times ran as high as 140, and again so low that death seemed certain. Respiration seemed entirely stopped, and the eyes fairly bulged out of their sockets. After working some time with her she seemed to rally, only to pass off in the same state as she was, and this continued for several hours. During this time anesthesia seemed complete over the whole body.

Several other, and equally interesting, cases of mine, I must omit for want of time. One day while visiting a fellow-practitioner, he injected cocain, how much I cannot say. The tooth was extracted, and then the trouble began,—cold, moist skin, suspended respiration, an erratic heart, and vomiting. One drachm of whiskey injected hypodermically, artificial respiration, amyl nitrite, and one hour's work brought him around all right. All these patients were closely questioned regarding their condition, and I found that either the stomach was without food for at least six hours, or that (in the cases of the women) they were either pregnant or catamenic. Accordingly I started to experiment on rabbits, by injecting one-tenth of a grain. On those that were well fed it seemed to have little effect. The males withstood it better than the females. Two out of three of the females that were about to have young died. They were all well fed. Those that had not had food for twelve hours showed more alarming symptoms, and one male and one female died out of three each. Two bucks had no food for twenty-four hours, and both died. In none of my experiments was any remedy tried, as I wished to see the exact result the drug would have. When I have desired antidotes I have used the very best amyl nitrite, atropia, whiskey, and ether subcutaneously.

It is better to prepare the solution as it is needed, as it decomposes after three days, or it may be kept perfectly for ten days if held in solution in chloroform-water ; but if solutions must be had on hand at all, try to have ten parts of antipyrin to one part of cocain. I have known but one death that was the result of cocain. On examination after death the brain, lungs, and left side of the heart were filled with blood. Records show that in the past few years about fifty cases of poisoning are reported annually, of which on an average two result fatally.

Discussion.

Dr. F. W. Low, in opening the discussion, said that the series of experiments made by Dr. Hausle were more important and interesting than any ever before reported. In a practice of twenty years, the only time he ever found it necessary to call a physician into his office was to help resuscitate a patient after a hypodermic injection of cocain. He thought the trouble was caused by a change in the nature of the drug, because it was not a freshly-made solution, and thought the only safe way was to have it prepared in tablets and make the solution new for every patient. He was experimenting with tropacocain ; had been using it for about a year, his attention having been called to it in an article from a German journal, which was republished in a Western journal. With tropacocain he has none of those slightly alarming symptoms so often following the use of cocain. His experiments would be continued, and he would report on them when completed. The case of trouble from the use of cocain, of which he spoke, was that of a lady who had a tooth to be extracted. He injected a small quantity of the solution around the tooth, and she immediately fainted ; he at once extracted the tooth, and thinks the consequent hemorrhage saved her life, though he gave her about eight ounces of whiskey. The heart had entirely stopped beating, or at least there was no regular beat that could be heard or felt.

In reply to a question as to the expense of tropacocain, Dr. Low said that he had had trouble in procuring it in this country, but got a supply from Germany ; it is expensive, but if it should be found valuable and a demand should arise for it, he thought the price would be more reasonable.

Dr. G. W. Melotte spoke of the exhilarating effects of cocain upon himself ; said it was greater than that of alcohol.

Dr. F. A. Lee, of Auburn, and a number of others spoke of mishaps from the use of Dorsenia and other local anesthetics containing cocain, and all united in the opinion that they were dangerous and that the use of them should be discountenanced as unprofessional.

Dr. C. S. Butler, of Buffalo, was glad to hear these references to the numerous secret preparations which were sold as local anesthetics, and said the profession in this state has taken a strong stand against all such secret preparations. A series of analyses conducted at the instigation of Dr. E. C. Kirk proved that of all that were on the market at that time only one contained no cocain; and in consequence of these analyses and the many seriously harmful results from their use reported, the New York State Society passed a resolution that it was contrary to professional ethics and professional advancement for the dentists to use any secret preparation or any preparation of which the formula is not published. Cocain itself may be used with some limitations, though there would always be some danger attending its use; but the secret preparations were condemned utterly.

Dr. H. W. ADAMY had had the same trouble with cocain and its preparations as the others; had noticed that he often had more trouble when he extracted one tooth than in cases where he extracted several at the same time. In one case he had to work for an hour and a half with a patient for whom he had extracted a single tooth before he was in condition to leave the office. He offered a resolution that the indiscriminate use of secret preparations for producing local anesthesia be condemned.

This resolution was adopted, and the subject passed.

Dr. F. L. SIBLEY, of Rochester, read a paper, entitled "Diagnosis of Pyorrhea Alveolaris."

In the diagnosis of pyorrhea alveolaris the author called attention to the importance of distinguishing between the two principal forms as determined by their origin,—viz, that variety resulting from deposits derived from the saliva, phosphatic in character, and the uratic variety caused by deposition of urates upon the cementum of the root in lithemic cases. He believed that many erred in instituting systemic treatment for lithemia in cases where the pyorrhea was caused by deposits of salivary origin.

An examination of the urine was necessary to clearly establish a diagnosis in lithemic pyorrhea.

There was no discussion of Dr. Sibley's paper, and Dr. F. J. WOODWORTH, of Rochester, read a paper, of which we give an abstract, entitled,—

LOCAL ANESTHESIA AND OBTUNDENTS.

Dr. Woodworth's paper dealt with the various methods in vogue for obtunding sensation in the operations of tooth-extraction, excavation of hypersensitive dentine, and in pulp-devitalization. He contended that obliteration of hypersensitiveness of dentine could be best attained by one of the three following methods, viz: by removing a portion of the protoplasmic contents of the peripheral ends of the tubuli and filling this space with some insoluble matter; reducing the temperature of the protoplasm until it was unable to conduct sensation, or coagulating the terminal endings of the fibrillæ by chemical means. For the first-named purpose he advocated the use of absolute alcohol, which because of its affinity for moisture would thoroughly remove sensation by removing a portion of the protoplasmic elements during the process of desiccation following the use of the alcohol. When the dentine has been thoroughly desiccated by the alcohol and warm-air blast, an application of some resinous material in alcohol was to be applied and then evaporated *in situ*. The resin solution would permeate and permanently fill the tubular openings to a certain depth, and to that extent would prevent a recurrence of hypersensitiveness, though the structure beneath the impregnated area would still be normally sensitive. As a general escharotic obtundent the author recommended carbolic acid applied after desiccation, though in sensitiveness at the cervical border, or when caused by abrasion, silver nitrate might be used to advantage; or, if necessary, carbolic acid could be followed by zinc-chlorid crystals in such cases. Refrigeration, where applicable, may be accomplished by rhigolene, methyl or ethyl chlorid.

The practice of filling sensitive cavities with oxyphosphate for obtunding purposes he had found to be unsuccessful in his hands.

For hypodermic injection in extracting he uses—

℞—Alcohol, ʒ vij;
Glycerol, ʒ ij;
Carbolic acid, gr. x;
Camphor, gr. ss;
Atropin, gr. j;
Cocain hydrochlor., gr. viij;
Nitroglycerin, gr. j.

The carbolic acid acts as a coagulant circumscribing the action of the cocain. The atropin counteracts the toxic effect of cocain, but may be substituted with antifebrin twenty grains, or possibly menthol thirty grains, with good results.

As an antidote the author recommended amyl nitrite as the best and most reliable.

Care in hypodermic medication must be exercised not to penetrate with the needle any of the larger blood-vessels or nerves. A cocain solution that was stronger than two per cent. should not be used, and antidotes always kept in readiness for an emergency.

Discussion.

Dr. F. A. Greene, of Geneva, said that in the first place, with regard to local anesthetics, it is a dangerous subject, and would better be left severely alone. The use of rubber plates never did one-hundredth of the harm to dentistry that the use of local anesthetics has. The great majority of them are secret, are bought and used without knowledge as to their components, and when trouble occurs the dentist knows nothing of what should be done to counteract the effects. Gas is both safer and more satisfactory for use in extracting. For obtunding dentine, the better way is to avoid preparations for diminishing the sensitiveness, and simply dry out the cavity carefully and use sharp instruments. If the cavity is wet, the bur will clog up and cause heat and pain from friction; and besides, the work cannot be seen properly. His plan is to apply the rubber-dam, with an apparatus which he showed, which consists of a small cup containing a coiled copper tube immersed in water. The cup has a lamp beneath it to keep the water hot, and the tube is arranged so a current of air is forced through it by means of a foot bellows or bulb. Using this to furnish a constant current of hot air, he can excavate the most sensitive dentine with almost no pain, and the cavity is absolutely dry and in the best possible condition for filling. The lamp being lit when the apparatus is ready for use, raises the temperature of the air from the normal of the mouth so gradually that the heat gives no discomfort. In many cases of nearly exposed pulps the heat will cause the thin layer of dentine over the pulp to crack open, and the pulp will be seen shriveled up like a shred of leather, and can be removed with no trouble or pain.

Dr. J. H. BEEBEE, of Rochester, said that when he was a student in the office of Dr. Holmes the latter invented an apparatus answering the same purpose as that described by Dr. Greene, but different in construction. This was found to answer the purpose, and proved very useful in practice.

Dr. F. W. LOW said he had had much experience with dental obtundents. The best he thought was arsenite of potash. He saw it described in the *Ohio Journal of Dental Science.* This, it was said, could be placed in a tooth and capped over with good result in sensitive dentine. He determined to try it, and asked a chemist, who told him he thought it might be used with safety and good effect. He procured a supply, and selecting such patients as had sensitive dentine, would place the arsenite of potash in the cavity and cover it, leaving it in place for ten to twelve hours. He found that the dentine then could be excavated with little or no discomfort. Had never had any bad effect till his last case, a girl of fifteen. He had left the preparation in the cavity for twelve hours as usual, but found it had no effect; so he made another application and left it in twenty-four hours. Then the operation was done and the tooth filled. Ten days afterward the patient returned with face swollen and suffering intensely. The filling had to come out, and he was still treating the tooth, but had little hope of eventually saving the pulp. This experience would teach him to be a little cautious about leaving the preparation too long in the tooth.

Dr. F. H. LEE, of Auburn, spoke of a prescription for obtunding dentine, composed of cocain and sulfuric acid, which had been published in the *Dental Practitioner*, contributed by Dr. C. N. Peirce. He had found it effective and safe.

Dr. J. H. BEEBEE did not use obtundents for sensitive dentine. His method was a good, sharp bur, rapid work, the expression of sympathy, and sometimes a little dry heat, and thought this better and saves time and trouble.

Dr. R. H. HOFHEINZ hoped that Dr. Low would report again on the arsenite of potash. He feared that the other cases would in time also turn up with trouble which would necessitate extraction of the pulps. In the one case, on account of the youth of the patient, fifteen years, the absorption was more rapid than in more densely calcified teeth, and the result appeared quickly; but he thought perhaps there was more trouble in store for the doctor in the future of the other cases. He agreed with Dr. Beebee that the best plan is to use sharp instruments, quick work, and dry heat. He had used cocain with generally but not invariably good results.

Dr. LOW said he only advocated the use of an obtundent in teeth that are exceedingly sensitive. The arsenite of potash he usually leaves in the tooth about twelve hours, and, as he reported, had never but in one case had trouble.

Dr. G. W. Melotte spoke of a method which he had seen in the office of Dr. Bing, of Paris. Dr. Bing had a cylinder of air compressed to about eight atmospheres. From this extended a pipe under which was a Bunsen burner, which heated the pipe as hot as could be. When the air was turned on and directed into a tooth-cavity, there was a *sizz* which lasted about a second, during which time the pulp was extracted painlessly.

Dr. S. B. Palmer said when excavation of tooth-substance was done under conditions requiring the thorough drying by hot air of the cavity, after the tooth is filled it will regain its moisture, and so will return to its sensitive condition ; and he thought the pulp would probably suffer from the drying process. His habit was to fill sensitive teeth temporarily with gutta-percha.

Subject passed.

(To be continued.)

ODONTOGRAPHIC SOCIETY OF CHICAGO.

The annual election of officers of the Odontographic Society of Chicago, held December 9, 1895, resulted as follows : Dr. C. E. Meerhoff, president ; Dr. E. R. Carpenter, vice-president ; Dr. H. H. Wilson, secretary ; Dr. Edmund Noyes, treasurer ; Dr. R. B. Tuller, Dr. C. E. Bentley, Dr. J. G. Reid, board of directors ; Dr. A. B. Allen, Dr. H. A. Drake, Dr. G. W. Schwartz, board of censors.

H. H. Wilson, *Secretary.*

◆

DENTAL SOCIETY ANNOUNCEMENTS.

TOPICS FOR DISCUSSION BY STATE AND LOCAL ORGANIZATIONS.

Suggested by the American Dental Association.

1. Should not the appointment of Dental Examining Boards be under the control of the State Dental Societies?

2. Should not the granting of certificates of qualification by Examining Boards to non-graduates be generally abolished?

3. To what extent is the washing of amalgam masses an important feature in the production of a good filling?

4. What results are to be expected in replantation or transplantation as a means of treatment of chronic phagedenic pericementitis?

5. The Committtee earnestly recommend that the report of the Committee on Dental Nomenclature of the American Dental Association be fully studied and discussed.

Louis Jack,
J. N. Crouse,
Edward C. Kirk,
Committee on State and Local Organizations.

FIRST DISTRICT DENTAL SOCIETY OF NEW YORK.

THE First District Society will hold a clinic on Tuesday, January 14, 1896, at 1.30 P.M., in Lyric Hall, Sixth avenue between Forty-first and Forty-second streets, New York.

Members of the dental profession are cordially invited.

H. J. HALL, *Chairman Clinic Committee.*

EDITORIAL.

DENTAL PEDAGOGICS.

IN our previous issue we used the expression, "the business of educating dental students."

The last annual report of the chairman of Section II (Education, Literature, and Nomenclature) of the American Dental Association sets forth that at the close of the session of 1894 there were forty-seven colleges in operation in this country granting degrees in dentistry, and since that date two more have been added to the list. In 1894 there were in attendance at these forty-seven colleges 5382 students, and upon 1233 of these at the close of the session, the degree was conferred.

From these figures it would seem that the business of educating students in dentistry is one of considerable magnitude.

The summary of colleges with their quota of students, as given in the report, we presume, includes all the institutions in this country, whether good, bad, or indifferent, and these represent all grades of educational efficiency as measured by the character of their product. That there is great diversity of method pursued in the dental educational process is a well-recognized fact, and that in large degree this diversity arises from imperfections in the methods pursued is admitted and deplored.

There is, however, a factor which accounts, to some extent, for the lack of uniformity in our educational system which is in no sense dependent upon lack of interest or due to incompetency on the part of dental teachers, but which arises from lack of organization for study and interchange of views upon the subject of dental educational methods.

To know dentistry from the point of view of the practitioner is one thing. The student acquires his knowledge and training in order that he may intelligently and skillfully apply what he has learned to the successful pursuit of his calling as a dental practitioner. To know dentistry from the teacher's standpoint implies not only all that is included in the educational equipment of the practitioner, but in addition to this the important qualification of ability to successfully impart this knowledge to others.

The ability to teach dentistry is an acquisition quite distinct from, though supplemental to, the ability to practice it. So important has the art of teaching become that the study and investigation of its principles now constitute a distinct branch of scientific work,—viz, pedagogics.

The importance of a recognition of pedagogical principles in their relation to the teaching of dentistry is already making itself felt. The introduction of the technic system of instruction, based as it is upon a well-recognized fundamental principle of psycho-physiology, has almost revolutionized the older plan of dental instruction. Like all broad generalizations, its special applications are far-reaching and manifold. There seems to be no department of dental instruction to which the principle is not in some degree applicable. A not inconsiderable danger likely to be encountered in the development of the technic system is that the enthusiasm begotten of its successful application in certain departments may lead to its empirical extension in other directions without due appreciation of the essential principles upon which the system is founded. Unless these principles are constantly kept in view, the mere empirical mimicry of methods in the extension of the system must finally bring discredit upon it in certain lines at least. Such a result ought to be sedulously avoided. The working out of these applications is a question of detail involving intelligent study and test. Only by practically testing a given method of teaching can its real value be determined.

No more instructive exhibit of the possibilities of the technic system is needed than that furnished by the late meeting of the National School of Dental Technics at Asbury Park. The meeting was instructive not only as a material exhibit of the work being done at various schools operating under the system in question, but more especially as showing the need for a thorough organization of the teachers of dentistry for an interchange of views upon the questions of educational methods. It is quite evident that while the annual meetings afford opportunity in some degree for discussion and mutual interchange of thought in this field, the few days devoted to them are totally inadequate for the purpose, when the scope of the subject and its varied and manifold details are considered.

Some other means for promoting the work of investigation and interchange of views in the lines referred to is needed ; the importance of the subject demands more thorough systematic development. Uniformity of dental educational standards can never be achieved until these are, to some extent, systematized.

As a means toward the ends noted it would seem that a periodical publication dealing exclusively with dental pedagogics is needed. Such a publication ought to receive sufficient support from the teaching corps and possibly the students of the colleges of this country to assure its financial success, at least to the extent of meeting the cost of its publication. Its pages should be open to all contributions bearing upon the principles and methods of teaching dentistry ; and even though limited as to circulation, or if only issued as a quarterly, it would furnish a medium for permanently recording the best that was known on the subject, and for disseminating ideas which would more than any other means tend to improve teaching methods and bring about greater uniformity of standards in our colleges.

But few, if any, of the established dental journals could devote sufficient space for adequate treatment of matter of the character under consideration, even if it were expedient, as affecting the success of the plan. The science and art of dentistry produce a volume of literature which is best cared for in its present channels. The science and art of dental teaching should produce a literary output of sufficient magnitude at this stage of its growth to warrant a distinct publication devoted exclusively to that field.

We make the foregoing suggestion, hoping that an interest in the matter may be stimulated, and shall be glad to receive an expression of opinion upon it from all who are or may be interested in its development.

GLYCEROL.

We have received numerous inquiries concerning Dr. Söderberg's article on "Pulp-Mummification" in the November issue, especially with respect to the meaning of the term glycerol, one of the substances entering into the formula of the paste which he recommends.

Glycerol is the new name given to glycerin, and formally adopted by the American Association for the Advancement of Science upon recommendation of the Committee on Nomenclature of its Chemical Section. The word glycerol occurs in the Standard, Century, Gould's, Billings's, and Foster's dictionaries, and is now the accepted term descriptive of propenyl hydrate ($C_3H_8O_3$), commonly known as glycerin.

"ORIGINAL COMMUNICATIONS."

Over six years ago the opinion was editorially expressed in a dental periodical concerning the literary outlook of dentistry, that "the profession was largely written out."

In its issue for March, 1890, the Dental Cosmos editorially reviewed the statement quoted, and took the ground substantially that it was an error, and that to accept such a conclusion as true would be detrimental to the last degree.

As evidence that what had already been said and written upon dental subjects was by no means all that could be or ought to be said and written, the COSMOS editorially suggested some twenty-five lines of study and investigation relating to as many important questions affecting dental science and art, concerning which there was urgent need for more and better information.

That many of the suggestions then made have borne good fruit is evidenced by the character of the output of dental literature during the six years following. Not a few of the suggested topics have been the subjects of original research, the results of which have formed the basis of articles that have appeared in our pages.

As especially bearing upon the question, and as a remarkable demonstration of the basis of our faith in the scientific and literary productiveness of the dental profession, we call attention to the fact that four of the six "Original Communications" appearing in the present issue embody the results of special scientific research in new fields, and each is a distinct and valuable addition to the common stock of dental knowledge. We doubt whether any other single issue of a similar publication has ever presented its readers with an exhibit of original investigations covering so wide a field.

No, the profession does not appear to be "largely written out."

NOTWITHSTANDING the fact that we have added an extra form of sixteen pages of reading-matter to this number of the DENTAL COSMOS, the demands upon our space have compelled us to lay over until the next issue a number of important articles and communications; among others, the usual instalment of our report of the American Dental Association.

We take this opportunity to acknowledge our indebtedness to Messrs. Lea Bros. & Co., publishers, for the privilege of using the cuts illustrating Dr. Cryer's paper, they being originally prepared for the "American Text-Book of Operative Dentistry."

DEATH OF DR. J. D. WHITE.

DR. JOHN DE HAVEN WHITE, formerly Professor of Anatomy and Operative Dentistry in the Pennsylvania College of Dental Surgery, and the first editor of the DENTAL COSMOS, died in Philadelphia on December 25, 1895, aged eighty years. An extended obituary notice will appear in our next issue.

PUBLISHER'S NOTICE.

THE DENTAL COSMOS FOR 1896.

THE volume just closed witnessed an unprecedented growth in the subscription list of the DENTAL COSMOS,—a clear increase of over five hundred *bona-fide* names, with the money paid in as an evidence of good faith. We have "heard of" more phenomenal increases in dental journal subscriptions, but we have never been shown the evidence in so tangible a form as we have it in this case.

This increase shows that the literary faculty is spreading among dentists, that there is a larger audience able to appreciate and assist in the upward march of the profession. So we confidently look forward to a continuance of the growth of our subscription list.

This issue is sent to every subscriber for 1895, whether he has renewed or not. We believe that its value will be so apparent that there will be few who will not send in their renewals promptly.

We commend a glance at its pages to those also who are not now subscribers, in the belief that its superiority over other dental journals will be so apparent as to win at once their support.

We will be grateful for prompt renewals. *All subscriptions not renewed are discontinued.* Any reputable dealer in dentists' supplies will accept subscriptions at the regular price: $2.50, post free, to United States, Canada, and Mexico; $3.00 to other U. P. U. countries. THE S. S. WHITE DENTAL MFG. CO.

◆

BIBLIOGRAPHICAL.

THE DISEASES OF CHILDREN'S TEETH, THEIR PREVENTION AND TREATMENT. A Manual for Medical Practitioners and Students. By R. DENISON PEDLEY, M.R.C.S., L.D.S. Eng., F.R.C.S. Edin., Dental Surgeon to the Evelina Hospital for Sick Children. With numerous illustrations. London, J. P. Segg, 289–291 Regent st., W.; Philadelphia, The S. S. White Dental Mfg. Co., cor. Chestnut and 12th sts., 1895. Price, cloth, $2.50.

The enlargement of the field of medical study and the specialization of its various departments, together with the elaboration of dental practice and study, have made it well-nigh impossible for the practitioner of medicine to acquire more than a speaking acquaintance with the problems of oral pathology and therapeutics. Force of circumstances compel him as a rule to limit his studies to those abnormal conditions of the mouth and teeth which have a direct relation to general systemic disorders. The disorders of the mouth and teeth which indirectly produce a general systemic impression, as well as the strictly local dental diseases, are almost without exception relegated to the care of the dental practitioner wherever intelligent practitioners of dentistry are available.

There are, however, circumstances where the medical practitioner is called upon for advice upon dental matters which, unless he has had exceptional opportunities for study, he will be at a loss to meet.

Mr. Pedley's book is a creditable attempt to supply the medical practitioner with a general view of the subject, that is at the same time sufficiently full in detail to enable him to intelligently meet the occasional demands which may be made upon him for dental advice and treatment.

The teaching of the book is, with few exceptions, good orthodox dental doctrine. Were it not that due regard should be paid to the author's purpose of writing a hand-book for the use of medical practitioners who it is presumed are thrown upon their own dental resources, we might feel inclined to criticise his instructions with regard to the extraction of teeth in connection with acute purulent conditions about their roots. For example, it seems scarcely logical to recommend the extraction of a molar with alveolar abscess, and advise against the extraction of an incisor or a cuspid under similar conditions. If treatment would restore the latter to usefulness, why not also apply it to the former? Certainly when utility alone is considered, the molar is the more important tooth.

The expediency of suggesting modes of treatment for the correction of irregularities of the teeth for the guidance of the physician in the performance of that department of dental work is questionable. The correction of dental irregularities is a specialized field of dental practice which demands most elaborate training, ingenuity, and skill, for its successful performance. It is almost inconceivable, even if he had the training, that a physician doing a general medical practice of such size as to warrant his practicing medicine at all could devote sufficient time to the treatment of dental irregularity cases to warrant even a hope of successful results.

The author's presentation of the subject of dental irregularities is exceedingly well done as far as it goes, and is valuable to the extent that it will enable an intelligent physician to decide what ought to be done, and perhaps to a limited extent how to treat the case, but as a guide to the practical correction of irregularities it is altogether insufficient. Work of this character should be done only by a well-trained, skillful practitioner of dentistry.

We regret to see the use of a number of terms in the text which should have been replaced by more modern and explicit ones: *e.g.*, the use of fang for root; of periosteum when referring to the pericementum of the root; interstitial for approximal, etc. As a whole, with the minor exceptions noted, the book is a thoroughly safe guide for those for whom it was written. It is, as measured by its own class standards, of more than average literary merit, and fully abreast of the latest scientific developments in its field. Its descriptions are clear and concise, and its whole tone thoroughly practical. It may be cordially recommended as satisfactorily covering the ground embraced within the limits of its title.

PAMPHLETS RECEIVED.

Eleventh Annual Report of the State Board of Dental Examiners, made to the Governor of Wisconsin, September 30, 1895; also the Official Register of Dentists holding certificates for the year ending September 30, 1896.

Pearson's Dentist's Appointment Book for 1896. R. I. Pearson & Co., Kansas City, Mo.

Transactions of the Illinois State Dental Society for 1895. With index 1865–1895. Chicago, H. D. Justi & Son, 1895.

◆

OBITUARY.

DR. ISAAC S. FOGG.

DIED, in Philadelphia, Pa., November 23, 1895, of pneumonia, DR. ISAAC S. FOGG, aged fifty-seven years.

Dr. Fogg was born in Harrisonville, N. J., March 7, 1838 He pursued his dental studies with Dr. Thomas L. Buckingham as his preceptor, graduating from the Pennsylvania College of Dental Surgery in 1859.

He began the practice of his profession in Woodstown, Salem county, N. J., but shortly thereafter moved to Philadelphia, where he soon established a full practice. His abilities as an operator, and the attributes of conscientiousness and uncompromising integrity which strongly characterized his professional and social relations, won for him the respect and esteem of all with whom he was in any way associated.

He was prominent in the Masonic order, was a member of the Washington Grays, a body of the State Militia of Pennsylvania, a member also of the Odontological Society of Pennsylvania, the County Dental Society, the Pennsylvania Association of Dental Surgeons, and of the State Dental Society of Pennsylvania.

Dr. Fogg was married in Philadelphia on December 14, 1872, to Miss Anna M. Levy, who with four children survives him.

The death of Dr. Fogg removes from the group of dental practitioners of Philadelphia one who was universally respected and admired for his abilities as a dentist, and beloved for his personal worth as a man.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

The abbreviations of titles used are those common to bibliographical work, and will, it is presumed, be readily comprehended by any one familiar with dental or scientific publications. Any explanation will be gladly furnished by the compiler. A star (*) indicates a Thesis.

Riegner (Hans.) Kronen- und Brücken-Arbeiten. Ein Lehrbuch. Leipzig, 1895, A. Felix, 300 pp. 8°.

Stocken (James.) Dental materia medica and therapeutics. 4. ed. revised by Leslie M. Stocken and J. O. Butcher. London, 1895, H. K. Lewis, 3 p. l., 155 pp. 24°.

Transactions of the Dental Society of the State of New York. 27 meeting, 1895. Albany, 1895, 88 pp. 8°.

Ames (W. B.) Substances plastiques. [*From:* Dental Rev.] Progrès dent., Par., 1895, xxii, 266-270.—**Andrews** (R. R.) A contribution to the study of the structure of the dentine,—the so-called "sheaths of Neumann." Internat. Dent. J., N. Y. & Phila., 1895, xvi, 655-660. [Discussion] 690-694.—**Angiome** de la langue. [*From:* Gaz. Hôp., Toulouse.] Rev. odont., Par., 1895, xxviii, 472.—**Barrett** (W. C.) The classification of so-called green-stain. Tr. Dent. Soc., N. York, Albany, 1895, xxvii, 65-69.—**Baxter** (Edwin C.) (Obituary.) Internat. Dent. J., N. Y. & Phila., 1895, xvi, 648.—**Belcher** (W. W.) The dental student. *Ibid:* 608-611.—**Berten** (J.) Hypoplasie des Schmelzes. (Congenitale Schmelzdefecte; Erosionen.) (Pathologisch-anatomisch-klinische Studie.) Deutsche Monatschr. f. Zahnh., Leipz., 1895, xiii, 533-548.—**Birch** (J. C.) Gold filling with Dr. de Trey's (of Basle) solila crystal mat gold. J. Brit. Dent. Ass., Lond., 1895, xvi, 615.—**Bradley** (F.) Judgment an important factor in the preservation of teeth. Internat. Dent. J., N. Y. & Phila., 1895, xvi, 664-670. [Discussion] 694-707.—**Brose** (L. D.) Neuralgia provoked by carious teeth complicating subsequent healing after cataract extraction. Ophth. Rec., Nashville, 1895-6, v, 121-124.—**Brown** (S. B.) Rhisodontrypy, or Hullihen's operation. Dental Reg., Cincin., 1895, xlix, 521-532.—**Brunton** (G.) Plaster impressions and special trays. J. Brit. Dent. Ass., Lond., 1895, xvi, 617.—**Burchard** (H. H.) Cause and being of teeth. Internat. Dent. J., N. Y. & Phila., 1895, xvi, 670-679.—**Buxton** (D.) Nitrous oxide anæsthesia. Brit. J. Dent. Sc., Lond., 1895, xxxviii, 865; 913.—**Case** (C. S.) The esthetic correction of facial contours in the practice of dental orthopedia. Ohio Dent. J., Toledo, 1895, xv, 545-564. ——— *Also:* Dental Reg., Cincin., 1895, xlix, 540-561.—**Chandler** (Thomas H.) [1824-1874.] (Obituary.) J. Brit. Dent. Ass., Lond., 1895, xvi, 641. ——— *Also:* Internat. Dent. J., N. Y. & Phila., 1895, xvi, 718.—**Cravens** (J. E.) Pyorrhœa alveolaris. *Ibid:* 591-601.—**Daly** (J. H.) The thorough removal of deposits in the successful treatment of pyorrhœa. *Ibid:* 605-608.—**Deux** cas de tabes dorsalis avec carie du maxillaire. Rev. odont., Par., 1895, xxviii, 444.—**Eames** (W. T.) Treatment of salivary fistula. Brit. M. J., Lond., 1895, ii, 1162.—**Edward** (J. H.) On the physiological action of chloroform and other anesthetic agents. J. Brit. Dent. Ass., Lond., 1895, xvi, 604-608.—**Ezard** (H. B.) Crystal mat gold. *Ibid:* 621-623.—**Farlow** (J. W.) Some remarks on removal of the tonsils. N. York M. J., 1895, lxii, 592-595.—**Flagg** (J. F.) Preparation of pulp cavity and canals. Ohio Dent. J., Toledo, 1895, xv, 366.—**Garretson** (James E.) [1828-1895.] (Obituary.) Internat. Dent. J., N. Y. & Phila., 1895, xvi, Nov. 4 p. p.—**Gerhardt** (M.) Ueber Regulirung von Zähnen. Deutsche Monatschr. f. Zahnh., Leipz., 1895, xiii, 549-555.—**Godon.** Traitement de certaines anomalies de direction par l'extraction prématurée des dents temporaires. Odontologie, Par., 1895, 2. s., ii, 547-552.—**Gramm** (C. T.) The etiology of green-stain. Tr. Dent. Soc., N. York, Albany, 1895, xxvii, 58-64.—**Grayston** (W. C.) Notes on the treatment and filling of teeth. Dental Rec., Lond., 1895, xv, 479-487.—**Grimbert** (L.) & **Choquet** (J.) Sur la présence du coli-bacille dans la bouche de l'homme pain. Compt. rend. Soc. de biol., Par., 1895, 10. s., ii, 664.—**Grundy** (C. D.) The hydraulic swager. J. Brit. Dent. Ass., Lond., 1895, xvi, 618-621.—**Guilford** (S. H.) Report of special committee on dental nomenclature. Ohio Dent. J., Toledo, 1895, xv, 571-573.—**Head** (J.) The dental filling. *Ibid:* 568-570.—**Hewitt** (F.) An inquiry concerning the safety and sphere of applicability of chloroform in dental surgery. Brit. J. Dent. Sc., Lond., 1895, xxxviii, 951.—**Himman** (H. B.) De la réimplantation des dents. [*From:* Progrès dent.] Rev. odont., Par., 1895, xxviii, 460-465.—**Hirsch** (M.) Ueber Hypnose. Deutsche Monatschr. f. Zahnh., Leipz., 1895, xiii, 561-564.—**Hopkins** (G. H.) A case of complete separation of the upper jaw. Lancet, Lond., 1895, ii, 1106.—**Hoppe** (R.) Relation entre la carie dentaire et l'engorgement des ganglions lymphatiques. [*From:* Brit. J. Dent. Sc.] Progrès dent., Par., 1895, xxii, 270-274.—**Humphreys** (J.) Science and dental surgery. J. Brit. Dent. Ass., Lond., 1895, xvi, 593-596.—**Jenison** (M. G.) The use of electricity in the treatment of hemorrhage. Ohio Dent. J., Toledo, 1895, xv, 565.—**Johnson** (W. B.) Removal of the superior maxillary bone for sarcoma, involving the cerebral and orbital cavities and the antrum of Highmore. Ann. Ophth. & Otol., St. Louis, 1895, iv, 466–472.—**Lennox** (R. P.) A method of obtaining a plaster model as good as the mouth, with a view to crowning one or more of the anterior teeth. J. Brit. Dent. Ass., Lond., 1895, xvi, 608–612.—**Levi** (C.) Sarcome mélanique du maxillaire inférieur gauche. Bull. Soc. anat. de Par., 1895, lxx, 196.—**Loup.** Sterilized olive oil as a local anæsthetic. Dental Rec., Lond., 1895, xv, 521–525.—**Lustig** (M.) Der augenblickliche Stand der Narkosenfrage. Deutsche Monatschr. f. Zahnh., Leipz., 1895, xiii, 559–561.—**Martin** (C.) De l'élongation des dents appliquée au traitement de quelques cas d'érosion dentaire. Odontologie, Par., 1895, 2. s., ii, 544–547. ——— Note sur l'enfoncement et l'élongation des dents. *Ibid:* 563–571.—**Martindale** (J. H.) Empyema of the maxillary sinus. Northwest. Lancet, St. Paul, 1895, xv, 408–410.—**Martinier** (P.) Nouvelles méthodes et appareils de redressement. Odontologie, Par., 1895, 2. s., ii, 513–544.—**Molyneaux** (G.) Nomenclature. Ohio Dent. J., Toledo, 1895, xv, 573–576.—**Naegeli-Akerblom** (H.) Zähne und Mundwässer. Therap. Monatsh., Berl., 1895, ix, 548–553.—**Nash** (W. G.) The influence of hot and cold drinks on the temperature of the mouth. Lancet, Lond., 1895, ii, 1190.—**National** (The) association of dental faculties. (Edit.) Internat. Dent. J., N. Y. & Phila., 1895, xvi, 713–717.—**Ogle** (C. J.) Anæsthetics. Brit. J. Dent. Sc., Lond., 1895, xxxviii, 976–981.—**Osborn** (H. F.) Recent investigations upon the embryology and pathology of teeth. Science, N. Y. & Lancaster, Pa., 1895, n. s., ii, 686.—**de Otaola** (J.) Algunas consideraciones sobre el valor del agua fréa en la higiene de la boca. Gac. méd. d. Norte, Bilbao, 1895, i, 125; 132.—**Palmer** (S. B.) Therapeutics of green stain. Tr. Dent. Soc., N. York, Albany, 1895, xxvii, 70–79. —**Pasteur** (L.) [1822–1895.] (Obituary.) J. Brit. Dent. Ass., Lond., 1895, xvi, 641.—**Peirce** (C. N.) What has been done by the profession in France on pyorrhœa alveolaris. Internat. Dent. J., N. Y. & Phila., 1895, xvi, 660–664.—**Renshaw** (J.) On a method of making seamless gold crowns. J. Brit. Dent. Ass., Lond., 1895, xvi. 613–615.—**Rodman** (W. L.) Multiple epulis of the lower jaw. North. Car. M. J., Wilmington, 1895, xxxvi, 262.—**Rose** (H.) Preparation of the materials for plate-work. Brit. J. Dent. Sc., Lond., 1895, xxxviii, 961–967.—**Rosenthal.** Hygiène de la bouche et des dents. Rev. odont., Par., 1895, xxviii, 473–480.—**Roughton** (E. W.) Chronic alveolar abscess. Brit. J. Dent. Sc., Lond., 1895, xxxviii, 876–889. ——— Exanthematous necrosis. *Ibid:* 933–945. ——— Odontomes. *Ibid:* 967–973.—**Seifert.** Une dent surnuméraire dans le nez. Rev. de laryngol. [etc.], Par., 1895, xv, 1021–1024.—**Smith** (E. B.) The pathological lesions of the inferior maxillary bone, with report of a case. Tr. Mich. M. Soc., Grand Rapids, 1895, xix, 225–230. ——— *Also:* Medicine, Detroit, 1895, i, 409–413.—**Stewart** (Carrie M.) Abrasion of the teeth. Dental Reg., Cincin., 1895, xlix, 532–535.—**Thomas** (F. W.) Epithelioma of the upper jaw. Med. News, Phila., 1895, lxvii, 482–484.—**Thompson** (A. H.) A basis for dental nomenclature. Ohio Dent. J., Toledo, 1895, xv, 576–579.—**Thompson** (G.) The advisability of bridge-work. J. Brit. Dent. Ass., Lond., 1895, xvi, 596–604.—**Tomes** (C. S.) Notes upon the chemistry of dentine. *Ibid:* 590–593.—**Tomes** (C. S.) Des récentes recherches du Dr. Black sur la constitution des dents. [*From:* J. Brit. Dent. Ass.] Rev. odont., Par., 1895, xxviii, 465–472.—**Tomes** (*Sir* John.) [1815–1895.] (Obituary.) Internat. Dent. J., N. Y. & Phila., 1895, xvi, 649.—**Touchard** (F.) La maladie de Fauchard et son traitement. Gaz. d. hôp., Par., 1895, lxviii, 1189–1194.—**Turner** (H. W.) Neuralgia. Dental Rec., Lond., 1895, xv, 488–493.—**Von Bremen** (E.) Procédés pour blanchir les dents. [*From:* Progrès dent.] Rev. odont., Par., 1895, xxviii, 455–460.—**White** (W. H.) Further experience with balsamo del deserto. Internat. Dent. J., N. Y. & Phila., 1895, xvi, 601–605.—**Williamson** (W. H.) Glass inlaying. J. Brit. Dent. Ass., Lond., 1895, xvi, 616.—**Witthaus.** Ueber den Einfluss der Erblichkeit erworbener Eigenschaften auf das menschliche Gebiss. Deutsche Monatschr. f. Zahnh., Leipz., 1895, xiii, 521–532.

◆

LIST OF UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING NOVEMBER, 1895.

November 5.—No. 549,464, to F. C. PRIESTLY. Electrical dental engine.
" *12.*—No. 549,543, to C. H. STAEHLIN. Cuspidor.
" " No. 549,872, to J. R. JONES. Dental plugger.
" *19.*—No. 550,113, to G. SIBLEY and R. N. STOCKTON. Hand-piece.
" " No. 550,114, to G. SIBLEY. Dental engine.
" " No. 550,209, to C. WALLER. Dental flask.
" *26.*—No. 550,508, to W. S. HOW. Dental tool.
" " No. 24,934, to A. W. BROWNE. Design for treadle.

THE
DENTAL COSMOS.

VOL. XXXVIII. PHILADELPHIA, FEBRUARY, 1896. NO. 2.

ORIGINAL COMMUNICATIONS.

ON THE FORMATION AND STRUCTURE OF DENTAL ENAMEL.*

BY J. LEON WILLIAMS, D.D.S., L.D.S., LONDON, ENG.

(The substance of this series of papers was read before the Royal Society of Great Britain on December 12, 1895.)

ALMOST every anatomist or histologist of note since the time of John Hunter has made some contribution to the subject of this paper. In going over the literature of the theme one is struck by the wide divergence of opinion expressed,—a divergence which is as marked and emphatic to-day as it was forty or fifty years ago. Broadly speaking, all who have written on the subject may be separated into two groups or schools: those who have taught that the formation of enamel is effected by direct cell-calcification, and those who have claimed that the tissue is produced by a secretion,—by the calcification of a cell-product. Between 1850 and 1860, Professor Carpenter was maintaining the former position, and during the same time the late Professor Huxley wrote several papers antagonizing this view, and claiming that enamel could not be produced by any conversion of a cellular structure. Curiously enough, his main contention was correct, although founded upon mistaken premises. In 1848 the late Sir John Tomes delivered a course of lectures in which he taught that enamel-formation is the result of the calcification of the enamel-forming cells. His son, Mr. Charles Tomes, in the last edition of his work on Dental Anatomy, published in 1894, still holds to this opinion, and these views are also shared by Waldeyer, Wedl, and many others. On the other side, Professor Schäfer in England, Spee in Germany, and Drs. Andrews and Sudduth in America, have maintained that the enamel-cells or ameloblasts are not directly calcified, but that they are the active agents in producing the material from which enamel is formed.

It is not my intention to present a summary of the history of the literature of this subject, and I have mentioned the foregoing names

---

* Copyright, 1896, by J. LEON WILLIAMS.

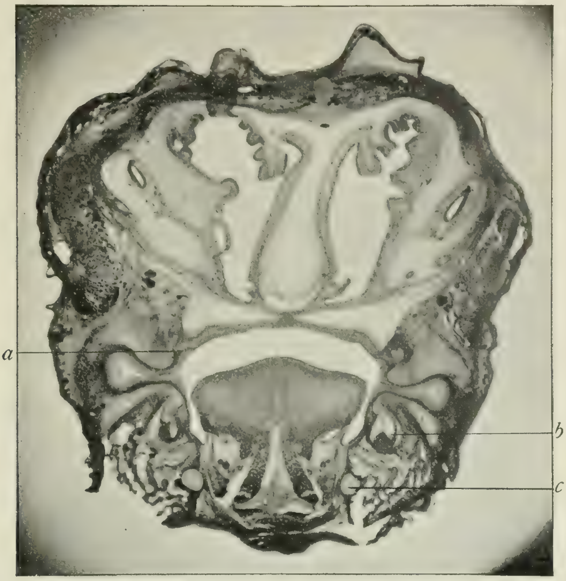
merely to show that the most eminent teachers have held and still hold widely different views. This difference, I believe, has largely grown out of relying too closely on one or on a few particular methods of working. I have seen many illustrations of the possibility of drawing contradictory conclusions from appearances presented by different methods of treating tissues, each of these conclusions, very probably, representing a half truth. Another reason may also be found in the very great difficulties attending the preparation of thin sections of developing teeth with all of the tissues in their normal relations.

In deciding, therefore, to reinvestigate the whole field of the development of the teeth, I determined at the outset to adopt a large number of methods of working, in the hope that by comparing the results of widely differing treatment I might unravel some of the tangles in which the subject has always been involved. I selected for the commencement of my work embryos of the cat, dog, sheep, cow, hog, and monkey, as well as human embryos of all stages of development. The rodents were also represented by mice, rats, and guinea-pigs. Some of the material was cut while fresh, and some immediately after fixing, by freezing processes. Other material was fixed and hardened by a great variety of processes and imbedded in balsam by the Weil process, or decalcified by different acids and imbedded in paraffin and celloidin. More than thirty different stains and combinations of stains have been tried, and sections have been mounted in balsam, Farrant's medium, glycerol, sulpho-carbolate of zinc in glycerol (my favorite medium for purposes of study), and other preservatives. Aside from the sections cut in the freezing microtome, all of the cutting has been done on a Minot microtome, and most of the photographs illustrating this paper are from the thinnest sections which can be cut on that excellent machine.

As there is but little difference of opinion concerning those earlier stages of tooth-development which precede the commencement of the formation of dentine and enamel, we need give no further attention to this period than is necessary for an introduction to the subject proper. All students of dental histology are now aware that the teeth are developed from two distinct tissues. The so-called enamel-organ is a product of the oral epithelium, while the dentinal germ or papilla is formed in the submucous or dermal tissues, the former being the first to appear. A rapid proliferation of epithelial cells along the borders of the developing jaws results in the appearance of a continuous ridge externally, while beneath this ridge a depression is formed by which the columnar or infant layer of epithelial cells is forced deeper into the submucous tissue. From the lower edge of this epithelial band, as it is called, arise the cords or pouches from which is developed the enamel-organ.

A section cut through the face of a porcine embryo, of six to eight centimeters in length, in the region of the eyes, will often show several phases of the early stage of tooth-development (Fig. 1). On either side of the tongue we shall see the epithelial bands, where at one point may be observed the budding pouch which is the commencement of the enamel-organ (Fig. 2). The pouch is seen to be slightly enlarged at its lower end, around which are already progressing those changes in the submucous tissue which result in the

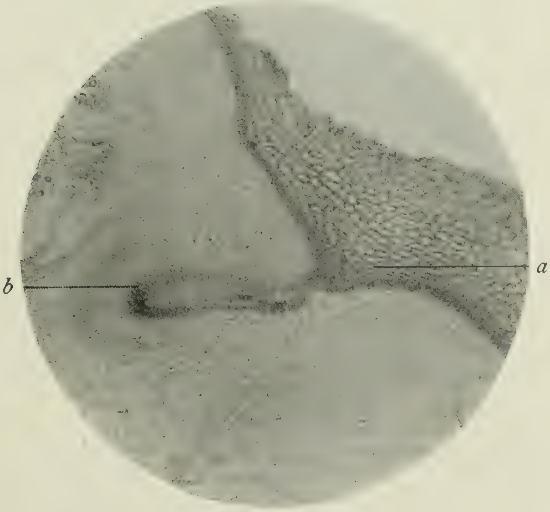
FIG. 1.



SECTION OF FACE OF EMBRYO PIG. × 12.

a, Epithelial band at the point where the cord of the tooth-germ arises; *b*, Tooth-germ in a more advanced stage than shown at *a*; *c*, Meckel's cartilage.

FIG. 2.

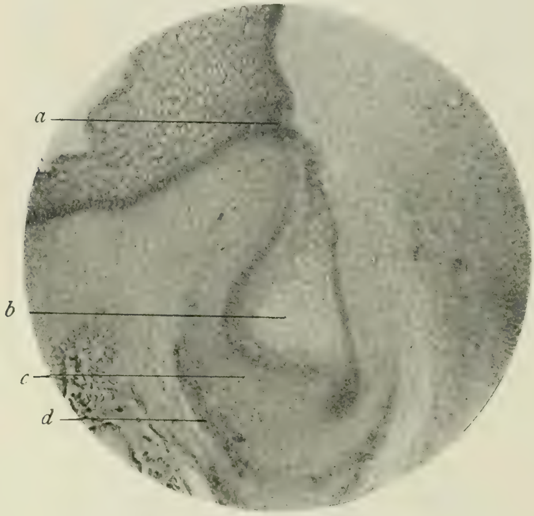


FROM THE TERRITORY SHOWN AT *a* IN FIG. 1. × 80.

a, Epithelial band from which the cord or pouch of the enamel-organ is given off, as shown at *b*.

formation of the dentinal germ and the tooth-sac. The lower end of this pouch, or the end which is farthest away from the oral epithelium, continues to enlarge. The external cells of the pouch become more distinctly columnar, while the cuboidal or round cells occupying the interior are transformed into the well-known stellate elements which constitute the reticulum of the enamel-organ (Fig. 3). The small, spherical cells which characterize the early stage of the dentinal germ appear directly opposite the enamel-organ, which is now beginning to be invaginated. The entire tooth-germ is being inclosed in a sac by connective-tissue elements, while beside and beneath this sac trabeculæ of bone are forming. A little later the lower edges of the invaginated enamel-organ will surround the papilla-like shape of the growing dentinal germ. The most conspicuous feature of the developing tooth at this stage is the reticulum of the enamel-organ, which is often several times larger than the dentinal germ (Fig. 4). The epithelial cells surmounting the dentinal papilla take on a more marked columnar form. These are sometimes called the cells of the inner tunic, while those composing the wall surrounding the reticulum of the enamel-organ are spoken of as the outer tunic. The differences between the incisor and molar teeth begin to appear even at this early stage, as may be seen by referring to Fig. 5. The tooth-sacs of the molars are spherical in shape, and there is a greater invagination of the lower edges of the enamel-organ. The next step brings us to the completely encapsuled tooth-germ. The connective-tissue walls of the sac are more complete, and the epithelial cord, which formerly connected it with

FIG. 3.

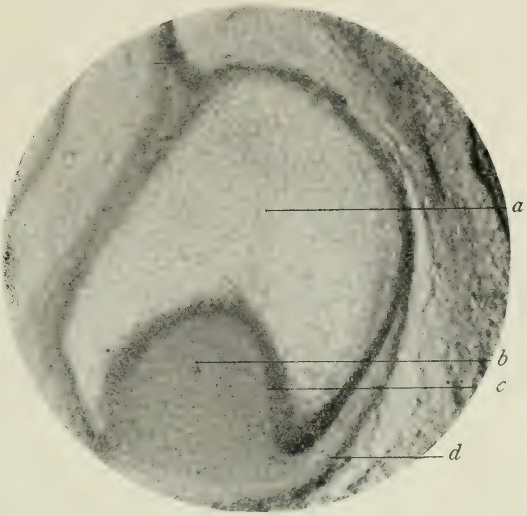


SECTION THROUGH JAW OF EMBRYO PIG. × 80.

a, Epithelial band at point where cord or pouch is given off; *b*, Formation of stellate reticulum of enamel-organ; *c*, Formation of dentinal germ; *d*, Formation of connective-tissue walls of tooth-sac.

the oral epithelium from which it originated, has entirely disappeared. The epithelial cells of the outer tunic are disappearing from atrophy and absorption, while those of the inner layer are assuming the characteristics of the enamel-forming elements or ameloblasts (Fig.

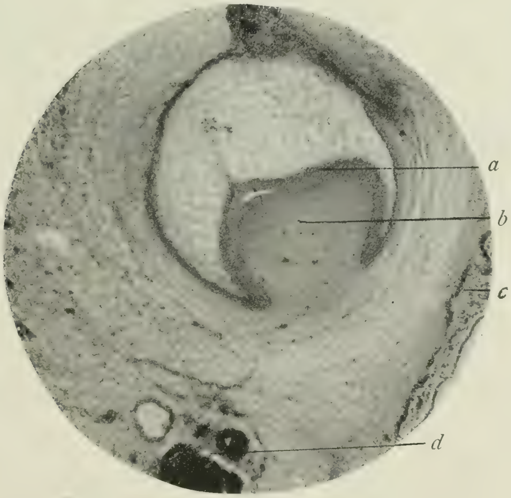
FIG. 4.



INCREASED MAGNIFICATION OF TOOTH-GERM AS SHOWN AT *b* IN FIG. 1. × 80.

a, Stellate reticulum of enamel-organ; *b*, Dentinal germ; *c*, Formation of ameloblasts; *d*, Connective-tissue walls of tooth-sac.

FIG. 5.

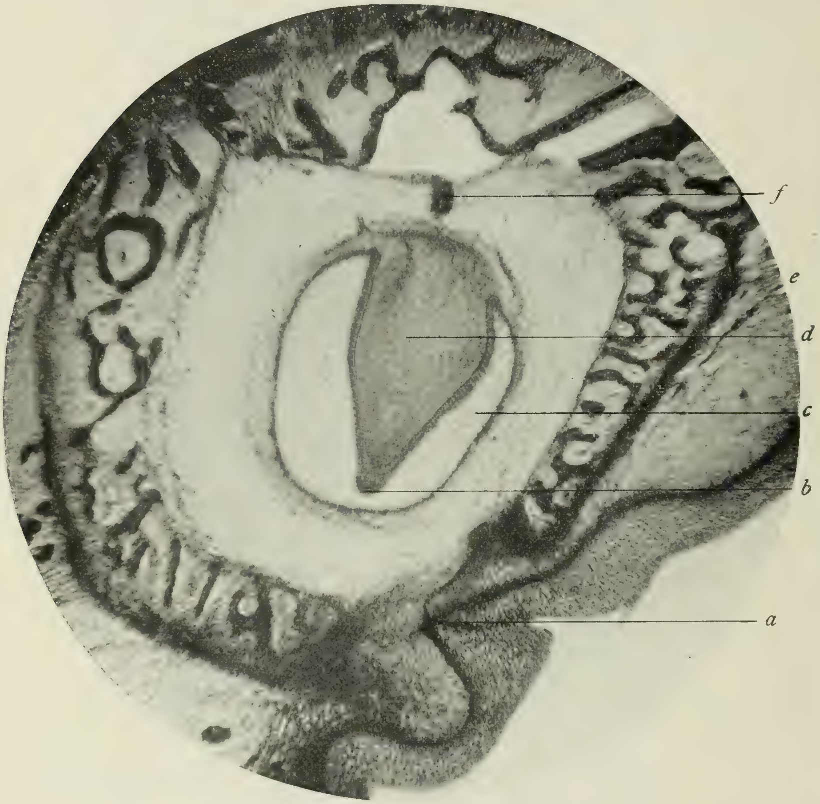


SECTION OF JAW OF EMBRYO PIG, SHOWING DEVELOPMENT OF MOLAR TOOTH. × 80.

a, Formation of ameloblasts; *b*, Dentinal germ; *c*, Formation of trabeculæ of bone; *d*, Formation of blood-vessels and nerves.

6). They are much elongated and enlarged from their original form as the infant layer of the oral epithelium, and the nuclei are moving to the outer ends of the cells. Between the ameloblasts and the reticulum of the enamel-organ a second layer of cells has been developed from a few of the original polygonal cells which were not converted into stellate cells. This layer is known as the "stratum intermedium," and performs a much more important function in the process of enamel-building than has heretofore been supposed. In a sectional view of the jaw at this period, the forming tooth is nearly surrounded by bone-trabeculæ, so that the germs of the teeth are now arranged in a bony trough. The principal blood-vessels and nerves are to be seen beneath the developing teeth near the bottom of this bony trough, and the first faint line of dentine, which precedes the formation of enamel, is observed about the tips of the dentinal germs which now represent the pulps of the future teeth. Fig. 7

FIG. 6.



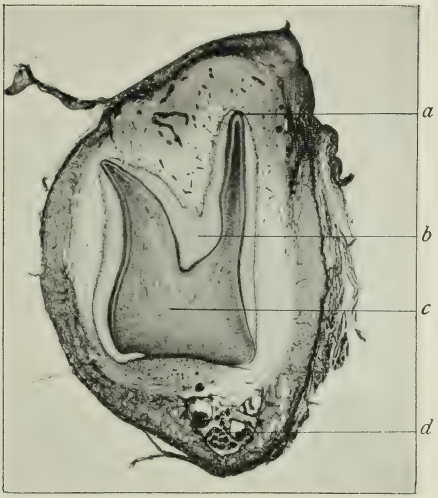
SECTION OF JAW OF EMBRYO PIG. × 50.

a, Epithelial band at point where cord of enamel-organ is given off; *b*, Globular mass of epithelial cells at tip of tooth-germ; *c*, Stellate reticulum of enamel-organ; *d*, Dentinal germ; *e*, Formation of bony walls of jaw; *f*, Formation of blood-vessel.

shows a section of the lower jaw of an embryo lamb at a period just preceding the commencing formation of enamel. This period in the development of the teeth, and also that which immediately follows when the commencement of enamel formation can be observed, is the most favorable time for studying the subject. A photograph from a section of a cuspid of a human embryo at about the seventh month of fetal life completes our introductory illustrations (Fig. 8). A cap of dentine has been formed at the tip of the developing tooth, and outside the dentine a thinner cap of enamel. Every stage of tooth-formation, so far as the crown of the tooth is concerned, is now progressing.

The first sections cut for these special studies were from the jaw of an embryo lamb at a period just after the commencement of enamel formation. The material was fixed in a saturated aqueous solution of corrosive sublimate, partially decalcified in a weak solution of chromic and nitric acids, and imbedded in paraffin. Sections were stained with a modification of the Ehrlich-Biondi fluid. Fig. 9 is a photograph from one of these sections. The appearances were different from anything I had before seen. There was no trace of a prismatic character in the partially decalcified enamel, but instead a faint appearance of fibers, running parallel with the inner ends of the ameloblasts, with small globular masses irregularly distributed among them. Other specimens somewhat differently treated showed fibers running at a right angle to those shown in this illustration, or parallel to the long axis of the ameloblasts. There is also another interesting point to be seen in this illustration. The staining fluid

FIG. 7.

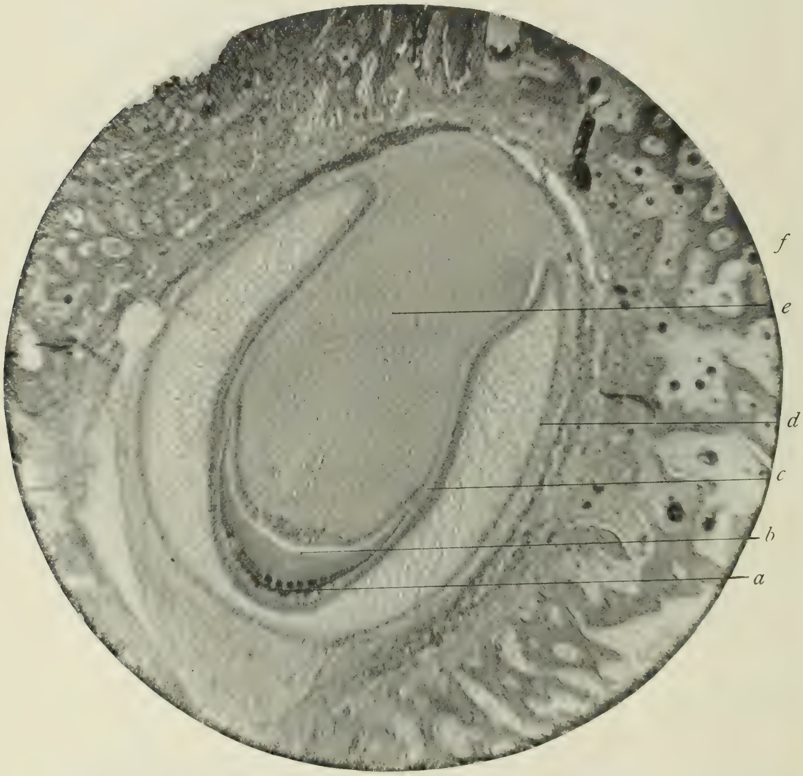


SECTION OF JAW OF EMBRYO LAMB. × 50.

a, Tip of cusp showing commencement of formation of dentine; *b*, Stellate reticulum; *c*, Dentinal germ; *d*, Formation of blood-vessels and nerves.

used was a combination of red, orange, and green. The broad, dark band at *a*, in the lower part of the photograph, is the partially decalcified enamel. Above this we see the ameloblasts stained a light straw color with their nuclei bright green, while on the outer ends of the enamel-cells and lying between them and the cells of the stratum intermedium, is seen a narrow band of a bright pink color. The cells of the stratum intermedium are of the same color as the ameloblasts, and we thus see that we have a clear, sharply marked and differentiated line separating these two layers of cells, which have heretofore always been represented as closely connected; in fact, several writers of acknowledged authority speak of the ameloblasts as being constantly renewed from the stratum intermedium. Closer examination of this specimen showed that the other end of the ameloblasts lying next the forming enamel was also bounded by a similar line. This last mentioned line has been seen and described by Raschkow, Huxley, and others as the membrana præformativa,

Fig. 8.

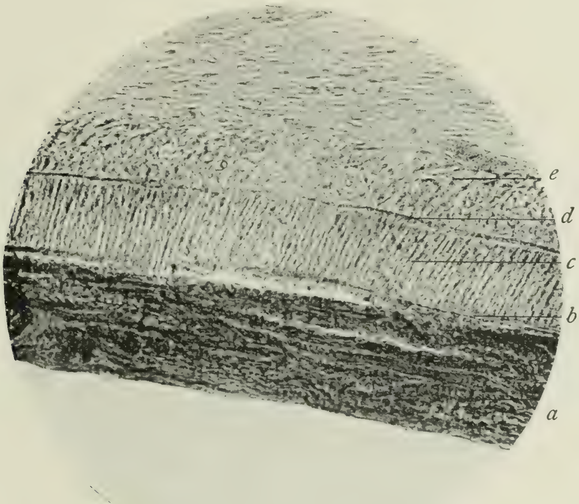


Section of Upper Jaw of Human Embryo near the Seventh Month of Fetal Life, showing Development of Temporary Cuspid. × 50.

a, Ameloblasts, showing also commencement of enamel formation; *b*, Dentine; *c*, Showing commencement of dentine formation; *d*, Walls of tooth-sac; *e*, Dentine germ or pulp; *f*, Formation of bony walls of jaw.

or structureless basement-membrane. Not all writers, however, who have used the term "membrana præformativa" are in agreement as to what constitutes this structure. Professor Huxley, for instance, says, "Neither the capsule nor the enamel-organ takes any direct share in the development of the dental tissues, all three of them—viz, enamel, dentine, and cement—being formed beneath the membrana præformativa, or basement-membrane of the pulp." He further says, in speaking of the membrane which may be detached from the surface of embryo teeth on the application of strong acetic acid, that "at its lower edge this membrane gradually loses all structure, and passes into the membrana præformativa. In fact, it is the altered membrana præformativa itself." We thus see that Professor Huxley sometimes used this term in a very broad sense, as though referring to the entire structure which may be raised on the application of acetic acid. This would often include the ameloblasts and the stratum intermedium. At other times he seems to refer specifically to the structureless layer which lies between the ameloblasts and the forming enamel.

FIG. 9.

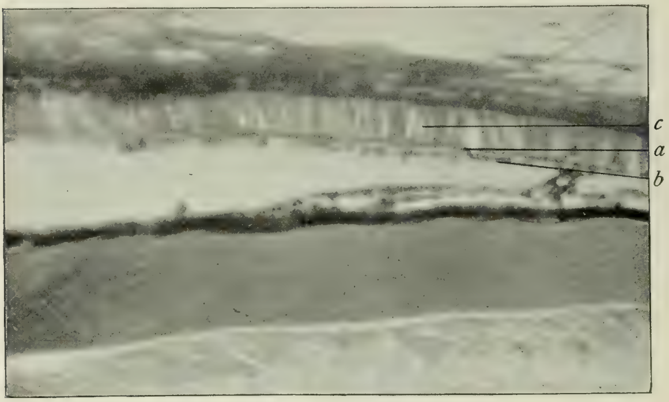


SECTION OF DEVELOPING TOOTH OF EMBRYO LAMB. × 150.

a, Decalcified enamel showing bundles of fibers with globular bodies intermingled; *b*, So-called "structureless membrane" lying between enamel-cells and forming enamel; *c*, Ameloblasts; *d*, Structure apparently identical with that shown at *b*; *e*, Cells of stratum intermedium.

As Mr. Charles Tomes points out, there has been much confusion and difference of interpretation as to the precise situation of this membrana præformativa; but in his explanation of the supposed structure he seems to have accepted Professor Huxley's more definite and specific interpretation of it as lying between the enamel-cells and the forming enamel. Mr. Tomes says, "Under the influence of such a reagent'' (acetic acid) ''this youngest layer of the enamel sometimes peels off in a sheet, bringing with it in places enamel-cells, in places enamel-prisms, adhering to its opposite sides.'' It is this thin sheet of recently formed enamel that has been mistaken, in Mr. Tomes's judgment, for a structureless membrane. From the accompanying illustrations, I think we shall be able to see that the line to which I refer cannot be thus explained. In Fig. 10, at *b*, is seen the thin line of torn-away enamel to which Mr. Tomes refers ; but immediately above it, at *a*, is also seen in section the so-called structureless basement-membrane. The line *b* is frequently seen in balsam-mounted sections, but, with my specimens, rarely in glycerol mounts. The structure is beautifully shown by selective staining in Fig. 11, both on the outer and inner ends of the cells, at *a* and *b*. This section is from the developing tooth of an embryo lamb near the tip of one of the elongated cusps or foldings of the grinding-surface. Still more convincing are the photographs, Figs. 12 and 13, where the membrane is very sharply differentiated by another method of selective staining. Here, in Fig. 12, the dentine at *f* is stained a purplish red, the enamel at *e* is pale green, while the line of basement-membrane at *d* is orange yellow. In Fig. 13 I have teased the enamel-cells away, showing the membrane adhering to their ends while the green-colored enamel remains intact. A further examination of the illustrations accompanying this paper will show the structure we have been describing under various aspects and differentiated by a great variety of methods of treatment as to fixing, hardening, and staining. It is impossible at present to speak definitely with reference to its origin, exact structure, or function. Its appearance at the ends of the cells and not between them would seem to argue against the suggestion that it is due to a condensation of the peripheral zone of the cells. But, on the other side, this view

FIG. 10.

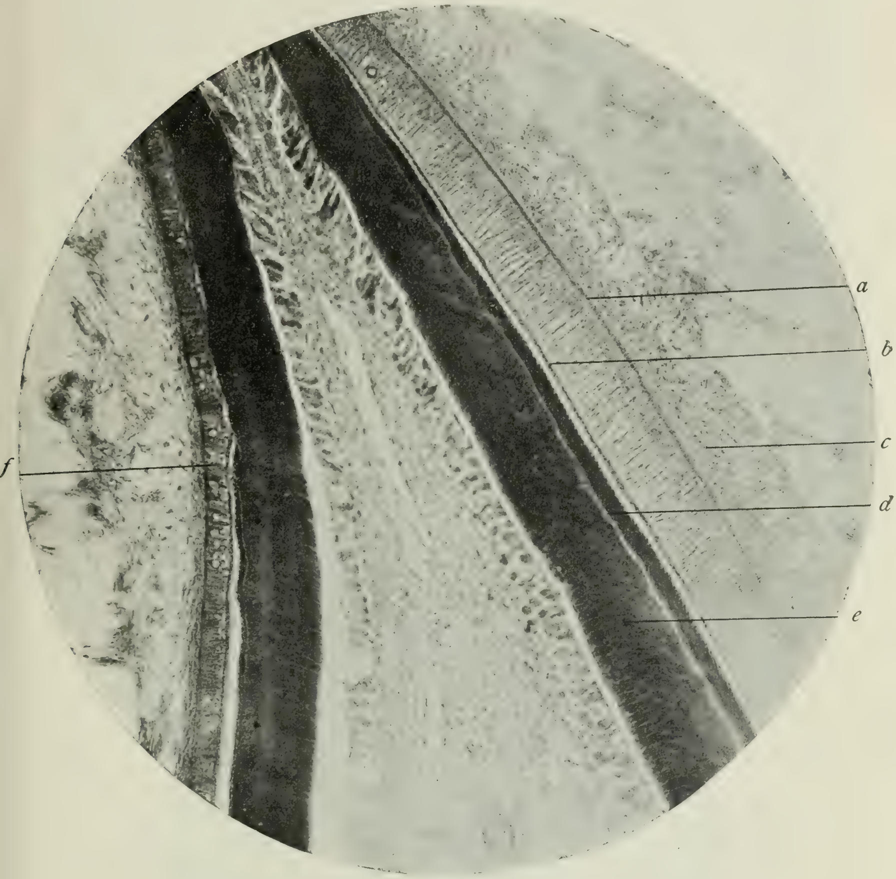


SECTION OF DEVELOPING TOOTH OF EMBRYO PIG. × 80.

a, Structureless membrane as shown at *b*, Fig. 9; *b*, Layer of forming enamel, somewhat resembling *a*, which is sometimes raised by shrinkage of tissue ; *c*, Ameloblasts.

is supported by the fact that it is not seen during the earlier period of the tooth-germ, but only after the nearly or quite complete specialization of the ameloblasts. There are also indications under high powers that it is composed of more than a single layer, and it is possible that it plays an important part in the elaboration of material for enamel-building. It varies considerably in thickness in different specimens, but persists throughout the entire period of enamel-formation,—a fact which would seem to give a decided negative to the theory that the ameloblasts are renewed from the stratum intermedium, as many writers on this subject have supposed. It seems almost a foregone conclusion that these cells must be renewed, or at least that the necessary increase in number during the progress of

FIG. 11.

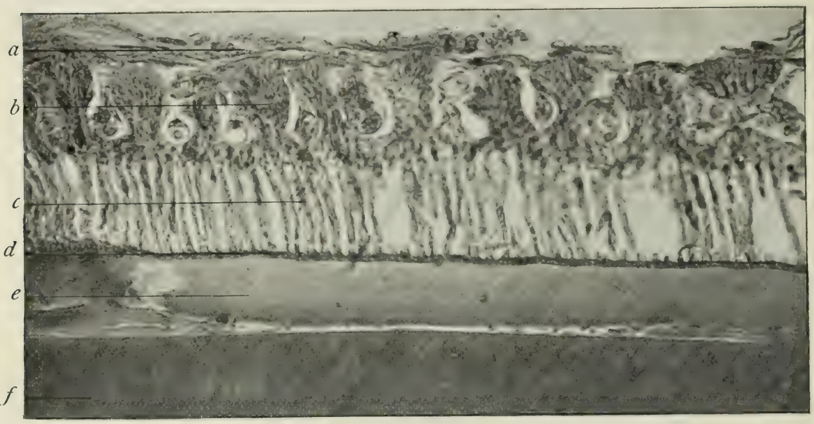


SECTION OF DEVELOPING TOOTH OF EMBRYO LAMB. × 150.

a, Outer ameloblastic membrane; *b*, Inner ameloblastic membrane; *c*, Cells of stratum intermedium; *d*, Forming enamel; *e*, Dentine; *f*, Ameloblasts showing globular masses of calcoglobulin.

enamel-development must come from cell-division. Selective nuclear stains may enable us to determine this question.

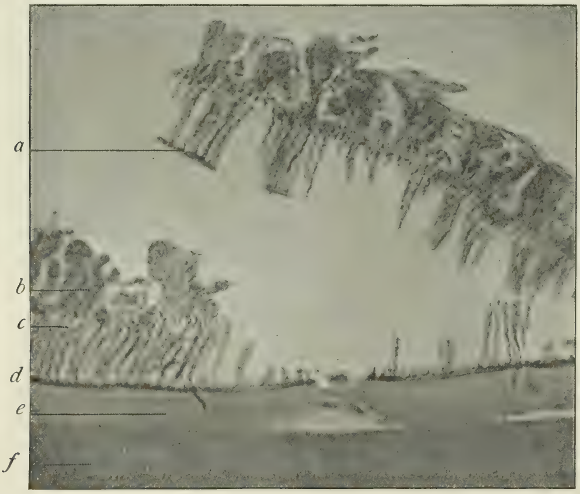
FIG. 12.



SECTION OF PERSISTENTLY GROWING INCISOR OF RAT. × 250.

a, Connective tissue and blood-vessels; *b*, Secreting papillæ of stratum intermedium; *c*, Ameloblasts; *d*, Inner ameloblastic membrane; *e*, Enamel; *f*, Dentine.

FIG. 13.

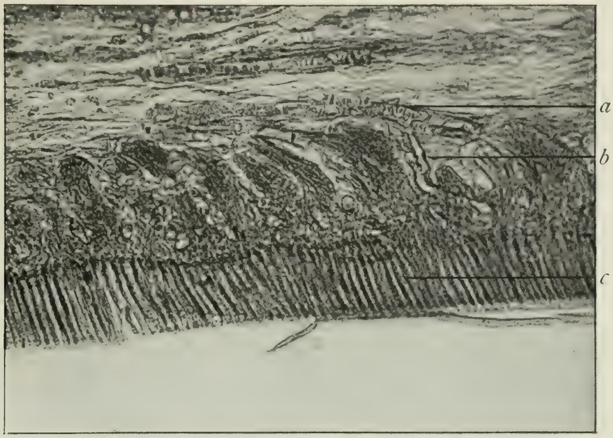


SECTION FROM SAME TOOTH AS SHOWN IN FIG. 12.

a, Inner ameloblastic membrane adhering to cells torn away from the enamel; *b*, Secreting papillæ; *c*, Ameloblasts; *d*, Inner ameloblastic membrane in normal position; *e*, Enamel; *f*, Dentine.

There is also another appearance bearing directly upon the origin of the structure we have been considering, which may be mentioned here. A distinctly-marked line may often be seen separating the ameloblasts from the odontoblasts, just before the beginning of dentine-formation. A little later, when the formative cells of the two tissues are separated by a considerable thickness of dentine, we may see a membrane-like structure covering the odontoblasts which appears identical with that bounding the inner ends of the ameloblasts. This would seem to suggest that there is an original basement-membrane separating the tissues from which these different cells originate,

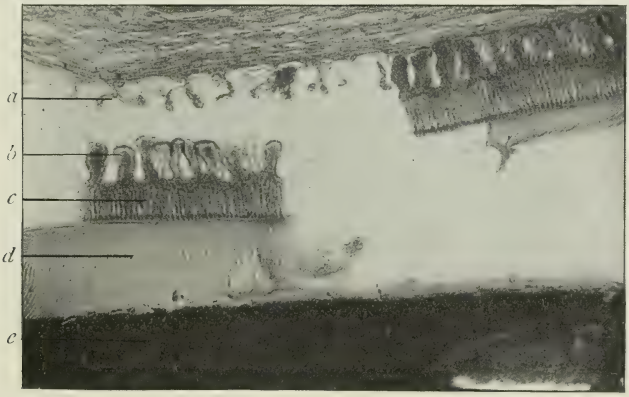
FIG. 14.



SECTION OF INCISOR OF RAT. × 175.

a, Blood-vessels with corpuscles *in situ*; *b*, Branch of same descending to supply capillary loops about secreting papillæ; *c*, Ameloblasts.

FIG. 15.



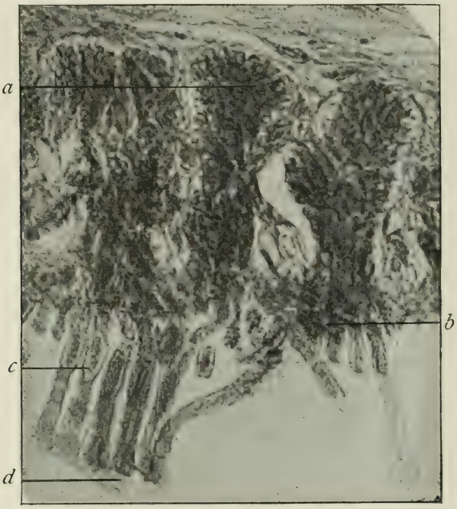
SECTION OF INCISOR OF RAT. × 80.

a, Capillary loops torn out of secreting papillæ; *b*, Secreting papillæ after removal of capillary loops; *c*, Ameloblasts; *d*, Enamel; *e*, Dentine.

and that just before the commencement of the formation of dentine it separates and remains as a covering for both ameloblasts and odontoblasts. This, however, would not offer any explanation of the membrane lying between the ameloblasts and the stratum intermedium. But whatever the origin or function of this structure may be, it exists, and it is desirable that we have some term for its designation. In view of its membrane-like appearance, I suggest that the structure lying between the ameloblasts and the enamel be called the inner ameloblastic membrane, while that which separates the ameloblasts from the stratum intermedium may be known as the outer ameloblastic membrane.

We now pass to consider another feature of the enamel-forming organ,—the stratum intermedium. These cells, it has heretofore been supposed, perform no particular function except the possible one referred to, until the formation of the enamel-prisms is completed, when, it is believed, they undergo some modification of form and become calcified as the outer cuticular layer of enamel known as "Nasmyth's membrane."

FIG. 16.

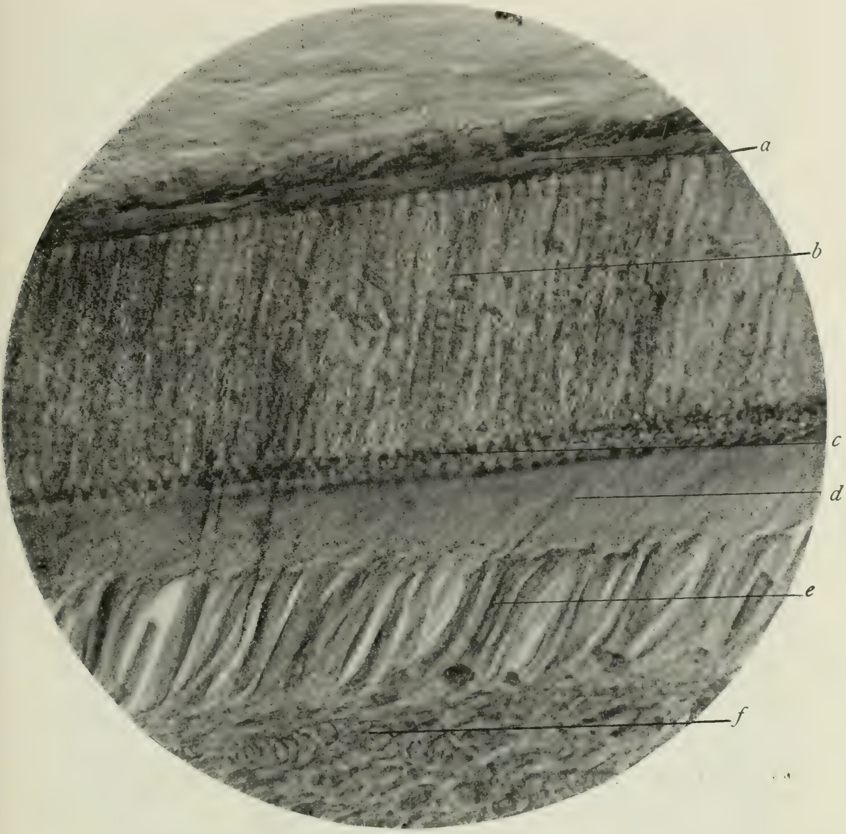


SECRETING PAPILLÆ AND AMELOBLASTS FROM ENAMEL-ORGAN OF RAT. × 600.

a, Papilla showing secreting cells; *b*, Showing roots of ameloblasts passing into papilla; *c*, Ameloblasts showing oval nuclei; *d*, Plasmic strings and granules emerging from ameloblasts.

I shall be able to show that this layer of cells constitutes a no less important factor in the formation of the tissue we are considering than the ameloblasts; indeed, it would appear that they are the more active of the two so far as concerns the selection of the proper material for enamel-building. It has for many years seemed clear to me that the enamel-organ, and more especially the cells of the stratum intermedium, should be classed among the true secreting tissues. I am not able to understand how so many good observers have failed to see the intricate plexus of blood-vessels which is very early developed in this layer of cells. Wedl, Magitot and Legros, Sudduth, and others say that they have uniformly failed to detect a blood-supply within any part of the enamel-organ proper; and yet, in a large majority of the photographs which illustrate this paper, it is as plainly evident as the ameloblasts or the stellate reticulum. In human embryos and in those of the monkey, dog, and some other animals, the resemblance of the stratum intermedium to glandular tissue, aside from the arrangement of the blood-vessels, is not particularly striking. But if we examine the evolution of this tissue in the enamel-organ of the mouse or the rat, its place among glandular structures at once becomes evident. We have already observed this tissue in an advanced state of development in Figs. 12 and 13. All appearance of round, polygonal, or oblong cells, as usually seen in

FIG. 17.

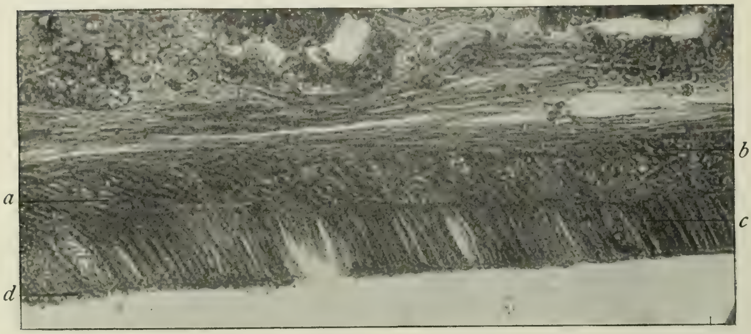


SECTION OF PERSISTENTLY GROWING INCISOR OF MOUSE. × 800.

a, Outer ameloblastic membrane showing fibrous nature; *b*, Ameloblasts with elongated, oval nuclei; *c*, Showing commencement of enamel formation by deposit of spherical bodies from ameloblasts; *d*, Dentine; *e*, Odontoblasts; *f*, Blood-vessel showing corpuscles *in situ*.

the stratum intermedium, has entirely disappeared, and in their place we have a highly differentiated secreting tissue. The ameloblasts are surmounted by epithelial papillæ, around and between which is a free distribution of capillary loops. The ameloblasts are seen to be in intimate relation with the papillæ, each ameloblast seeming to have a root-like process which extends into and is lost in the substance of the papilla to which it belongs. The diameter of each papilla is equal to about that of five or six ameloblasts, and each papilla may therefore be said to supply from twenty to twenty-five ameloblasts. In Fig. 14 blood-vessels are seen, in both transverse and longitudinal section, everywhere about the papillæ, and at *b* we may observe a branch descending to supply the loops which pass round the ends of the papillæ lying next the ameloblasts. In Fig. 15 I have torn away

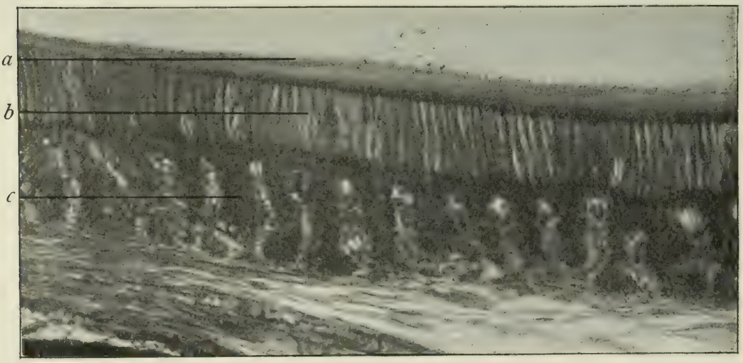
FIG. 18.



SECTION OF ENAMEL-ORGAN OF MOUSE. × 200.

a, Spindle-shaped cells of stratum intermedium; *b*, Showing development of secreting papillæ from spindle-shaped cells; *c*, Ameloblasts; *d*, Spherical bodies emerging from ameloblasts.

FIG. 19.

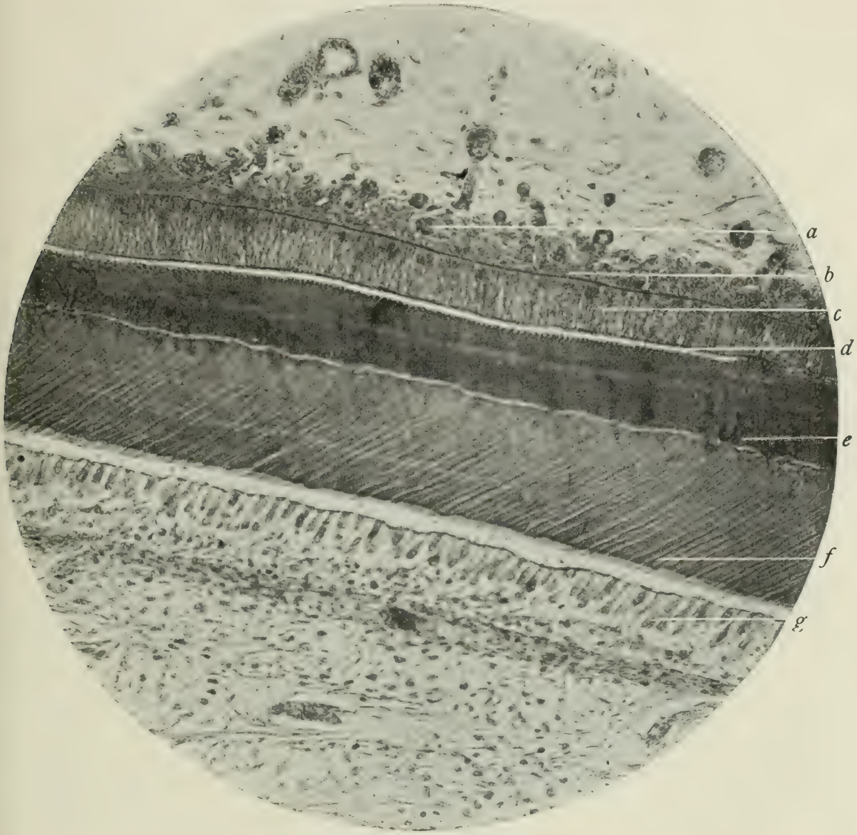


SECTION OF ENAMEL-ORGAN OF MOUSE. × 200.

a, Showing complete development of secreting papillæ; *b*, Ameloblasts; *c*, Enamel.

the connective-tissue fibers surrounding the papillæ, and in doing so have pulled some of these capillary loops away from their connection with the secreting cells. Fig. 16 shows the ameloblasts with their secreting papillæ under a magnifying power of about six hundred diameters. At the *commencement* of enamel-formation in the teeth of the mouse there is but little indication of a special secretory organ, as may be seen by referring to Fig. 17. We see here that the outer ameloblastic membrane is not structureless, but is apparently composed of very fine fibers. Outside of this is a layer of cells which somewhat resemble the connective-tissue cells of the periosteum. Fig. 18 represents an advance toward the development of papillæ from these spindle-shaped elements. Beginning at the left of the illustration at *a*, and looking along this layer of cells toward *b*, we see the gradual evolution of rounded cells, the chief characteristic of

FIG. 20.



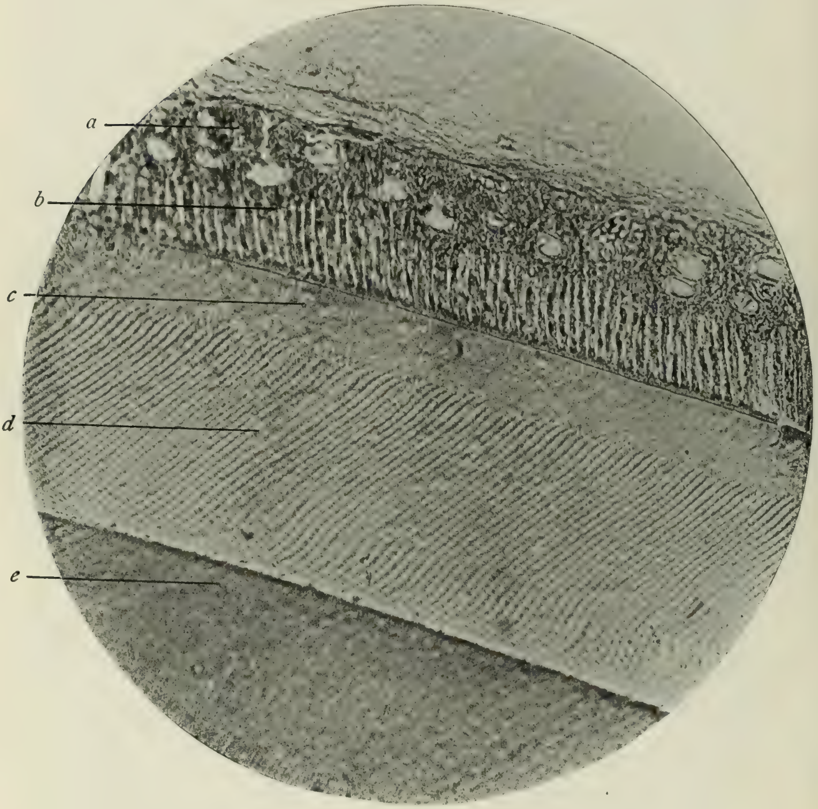
SECTION OF DEVELOPING TOOTH OF LAMB. × 150.

a, Cells of stratum intermedium more or less regularly arranged about capillaries; *b*, Outer ameloblastic membrane; *c*, Ameloblasts; *d*, Inner ameloblastic membrane; *e*, Enamel; *f*, Dentine; *g*, Odontoblasts also covered by a membrane-like structure.

which is the radiating processes by which they are united to one another and to the ameloblasts. A little later, at Fig. 19, we may see these round cells formed into papillæ.

The cells of the stratum intermedium in the enamel-organ of the tooth of an embryo lamb (Fig. 20, *a*) show a marked tendency to a more or less orderly arrangement about the capillary loops, but I have not yet seen any well-defined papillæ except in the enamel-organs of rodents. It is now perfectly evident, however, that in the development of enamel the cells of the stratum intermedium play the most important part in the selection from the blood of the material for the construction of this tissue. The formation of enamel begins, however, before the full development of the stratum intermedium, and it is highly probable, as has been pointed out by previous writers, that the material for the commencement of enamel-formation is stored in the stellate reticulum.

FIG. 21.

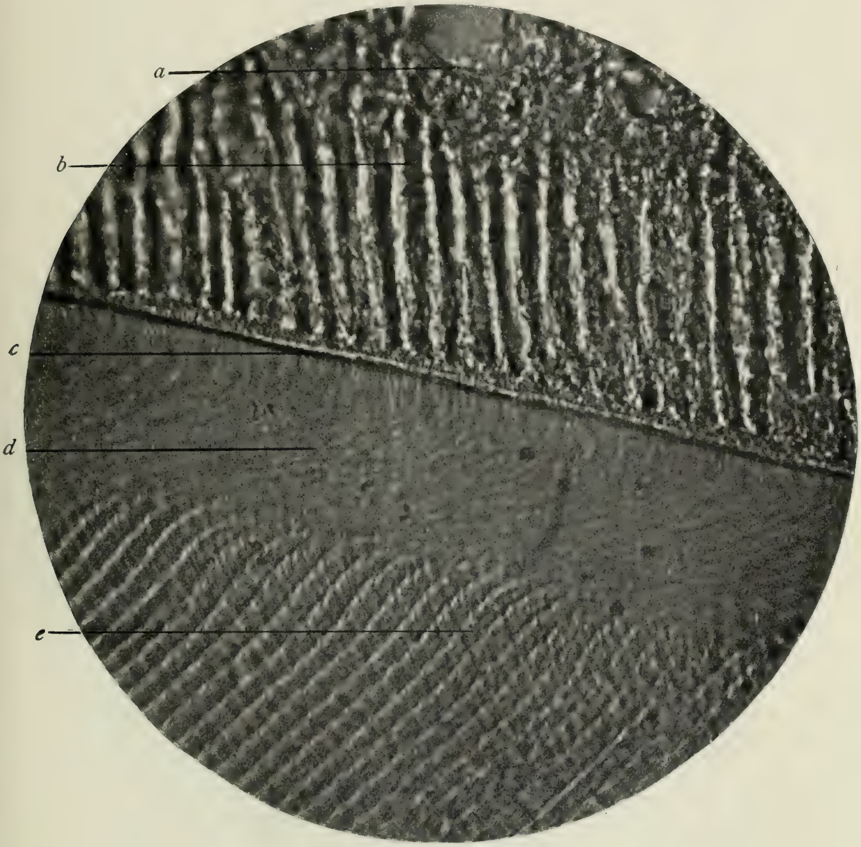


SECTION OF INCISOR OF RAT. × 200.

a, Secreting papillæ; *b*, Ameloblasts; *c*, Outer fibrous or "cortical" layer of enamel; *d*, Enamel-rods; *e*, Dentine.

A critical examination of the structure of enamel under medium and high powers makes it plainly evident that the views held by several well-known authors that the structure of this tissue corresponds to and is due to the structure and arrangement of the ameloblasts is quite untenable. We might rely for this conclusion on the one fact that while the shape and arrangement of the ameloblasts in many animals is practically the same, yet the structure of the enamel in these same animals varies greatly. And while this is true as a general statement, we shall also find that a close examination of any particular instance we may select will add evidence to our statement. If we compare the completely formed enamel in the tooth of the rat (*Mus decumanus*), as shown in Fig. 21, with the enamel-cells, we shall see that the resemblance is very remote, and most remote in the

FIG. 22.



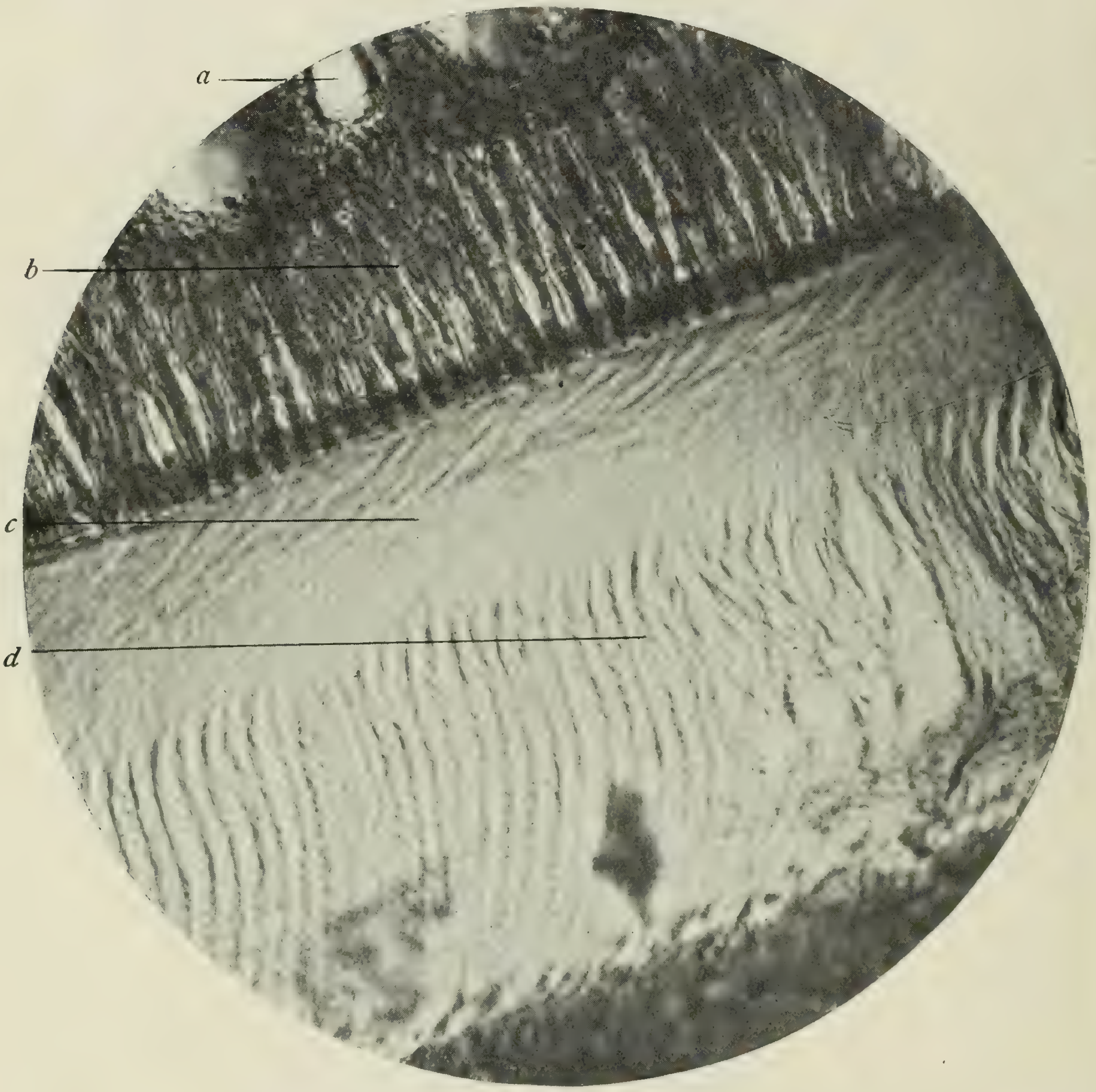
SECTION OF INCISOR OF RAT. × 800.

a, Cells of secreting papillæ showing connection by radiating processes; *b*, Ameloblasts also connected as above; *c*, Showing plasmic strings emerging from ameloblasts and entering enamel; *d*, Fibrous layer of enamel; *e*, Enamel-rods showing varicosities and bundles of cross fibers.

more recently formed enamel, where, from the point of view which we are criticising, we should expect to find the resemblance most marked.

Out of the many illustrations of forming enamel that I have observed in the writings of those who have taught the theory of cell-calcification, I cannot recall a single one where the long axis of the ameloblasts does not correspond with that of the enamel-prisms.

FIG. 23.



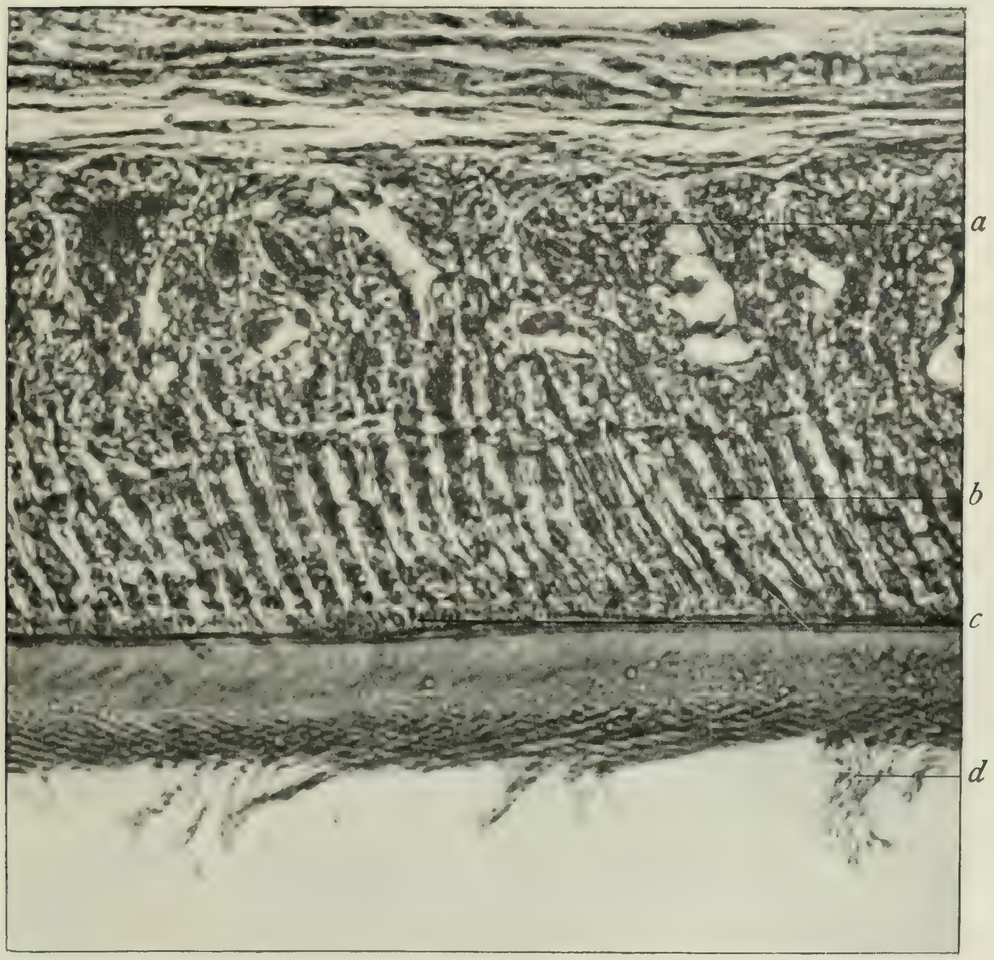
SECTION OF INCISOR OF RAT, SHOWING PARTIAL DECALCIFICATION OF ENAMEL. × 600.

a, Position of capillary loop; *b*, Ameloblasts; *c*, Outer fibrous layer of enamel; *d*, Showing fibers descending and twisting about each other to form stroma of enamel-rods.

This arrangement would seem to be a necessity of the theory, but it is an arrangement which very rarely occurs in nature, and the few rare occasions where I have seen it have always been near the commencement of enamel-formation. A little later the relative position of cell and prism is always in longitudinal section, as shown in Fig. 21 and many other illustrations in this paper. The usual angle ranges between twenty and thirty degrees. Again, it has been said that each varicosity of an enamel-prism represents a calcified ameloblast. Here again the theory does not square with the facts, for I have sometimes counted fifteen varicosities within the length of a single ameloblast, and I have never found less than eight to each cell.

If we look once more at Fig. 21, we shall see that the enamel-prisms or rods do not pass through the entire distance between the dentine and the ameloblasts. There is a comparatively clear band, equal to about one-fourth of the entire enamel thickness, lying next to the cells. Looking closely at this band, we see that it is made up of two sets of fibers, running in nearly opposite directions, neither direction corresponding with the long axis of the ameloblasts. One set of fibers passes in a somewhat more oblique course than the other, and becomes confluent with the ends of the enamel-prisms. The other set of fibers sweeps downward on a circular course, crossing the more oblique-running fibers and the enamel-prisms nearly at right angles. We also see, looking across the entire field of enamel in the view, that the varicosities of the prisms are exactly opposite each other with reference to this last-mentioned set of fibers. Sometimes (Fig. 23) both sets of fibers join, and, twisting about each other

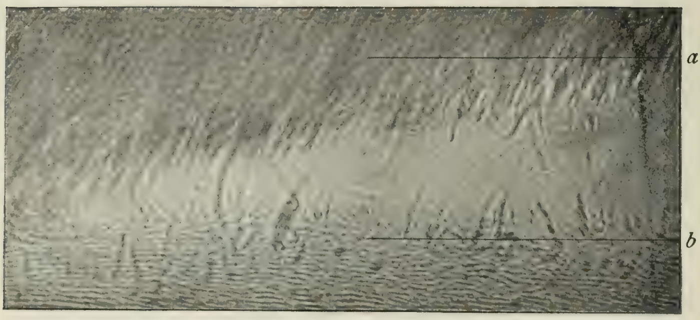
FIG. 24.



SECTION OF ENAMEL-ORGAN OF RAT. × 400.

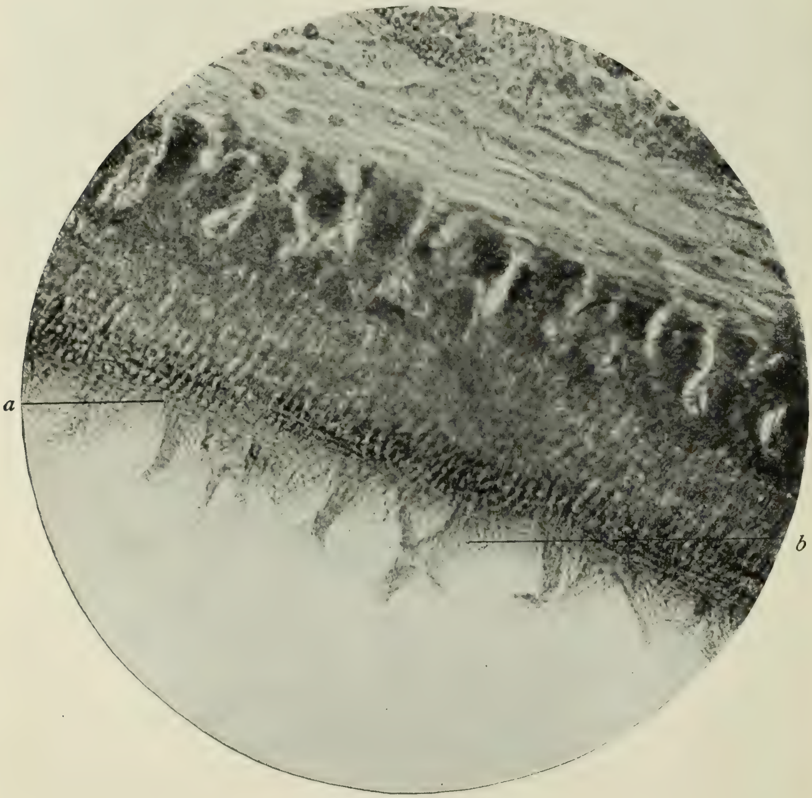
a, Secreting papillæ; *b*, Ameloblasts; *c*, Plasmic strings descending from ameloblasts to form fibers of enamel stroma; *d*, Enamel torn to show fibrous character.

FIG. 25.



SECTION OF ENAMEL OF RAT PREPARED BY MR. G. HOWARD MUMMERY. × 300.
a, Enamel-rods showing varicosities or cross markings ; *b*, Interlacing of fibers.

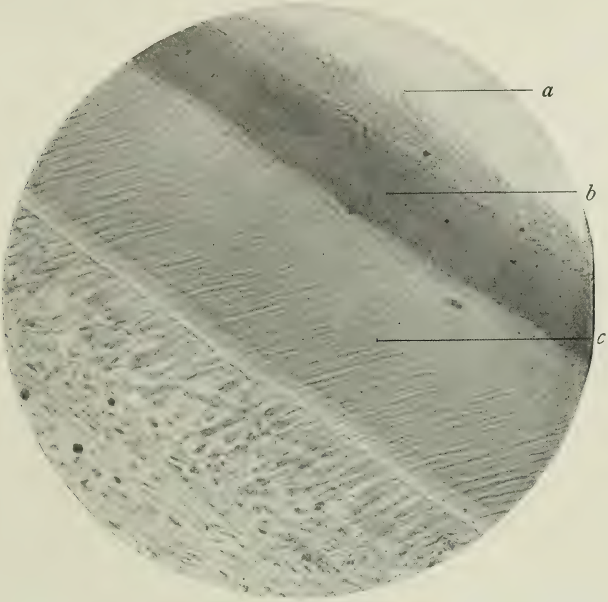
FIG. 26.



SECTION OF ENAMEL-ORGAN OF RAT. × 300.
a, Set of fibers running across ends of ameloblasts ; *b*, Interlacing of fibers.

in a rope-like design, pass along the course of the enamel-prisms. This last specimen has been treated with acids, which, while often bringing out the fibers more distinctly, sometimes causes the varicosities to partly disappear, especially if the action of the acids is continued for some time. It is probable that the arrangement of fibers is fairly constant in teeth of the same animals, although differing widely in teeth of different animals, but it is only by cutting sections in a great variety of directions that one at last gets a true picture of the complex arrangement of fibers and rods. Enamel from the teeth of rats and mice shows a more marked fibrous character than any other that I have examined, and the most striking feature of arrangement of the fibers is the interlacing or weaving together of those running in different directions, like warp and woof in a web. This is very plainly shown in Fig. 24, where the torn edge of the enamel bears a striking resemblance to the effect produced by tearing a woven fabric of any sort. Appearances somewhat akin to those shown in this illustration have sometimes been attributed to a layer of enamel-prisms lying beneath those shown on the surface and passing in an opposite direction. But we have here to explain an entirely different condition. Not only are there a considerable number of these finer fibers passing to each enamel-rod, but these fibers on the outer surface of finished enamel actually interlace, as may be seen by a close inspection of Figs. 25 and 26. Fig. 25 is from a section pre-

FIG. 27.

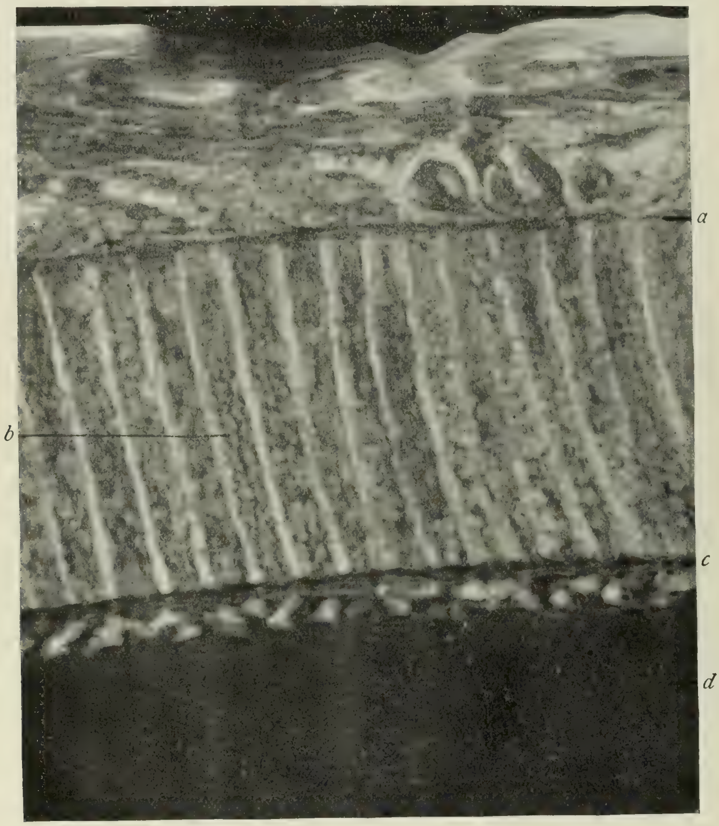


SECTION OF DEVELOPING TOOTH OF EMBRYO LAMB. × 150.

a, Outer layer of enamel, treated for a short time with solution of nitric and chromic acids, showing fibrous stroma ; *b*, Enamel still retaining lime-salts ; *c*, Dentine.

pared by Mr. J. Howard Mummery, by the Weil process, where, by a fortunate accident, the enamel is torn in the middle of the section. The illustration is valuable in confirming views drawn from sections prepared by other and widely different methods. A third set of fibers (Fig. 26) may sometimes be seen running parallel to the ends of the ameloblasts. These fibers are also faintly shown in the same position in Fig. 23.

FIG. 28.

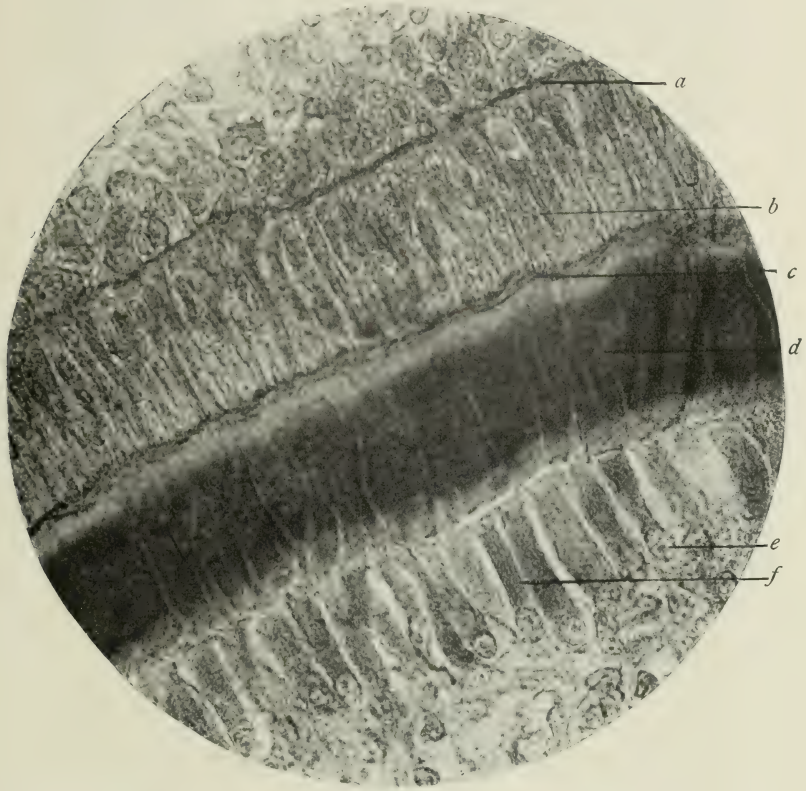


SECTION OF DEVELOPING TOOTH OF EMBRYO DOG. × 1500.

a, Outer ameloblastic membrane; *b*, Ameloblasts showing plasmic strings and net-work structure of cell-contents; *c*, Inner ameloblastic membrane slightly raised from the forming enamel and showing deposit of globular bodies; *d* Dentine.

In the developing tooth of an embryo lamb (Fig. 27), the outer layer of which has been acted upon by acids, we have another aspect of the fibrous stroma in which the mineral substances of enamel are deposited. These fibers are undoubtedly identical with the plasm strings which are often visible in the ameloblasts. They may be seen, in Fig. 28, passing from the lower ends of the ameloblasts into the forming enamel. But while in the forming teeth of the rodents the plasmic contents of the ameloblasts are seen in the form of strings which appear as calcified fibers in the formed enamel, in other animals, and especially in sections of the developing teeth of human embryos, when stained with nigrosin, the ameloblastic cell contents appear as a net-work (Fig. 29). The pattern of this net-work is very regular, the granules or points of connection being nearly always exactly opposite each other. We shall examine the nature of this net-work more in detail when we come to consider its reappearance in the completely formed enamel of mature teeth.*

FIG. 29.



SECTION OF DEVELOPING TOOTH OF EMBRYO CALF. × 800.

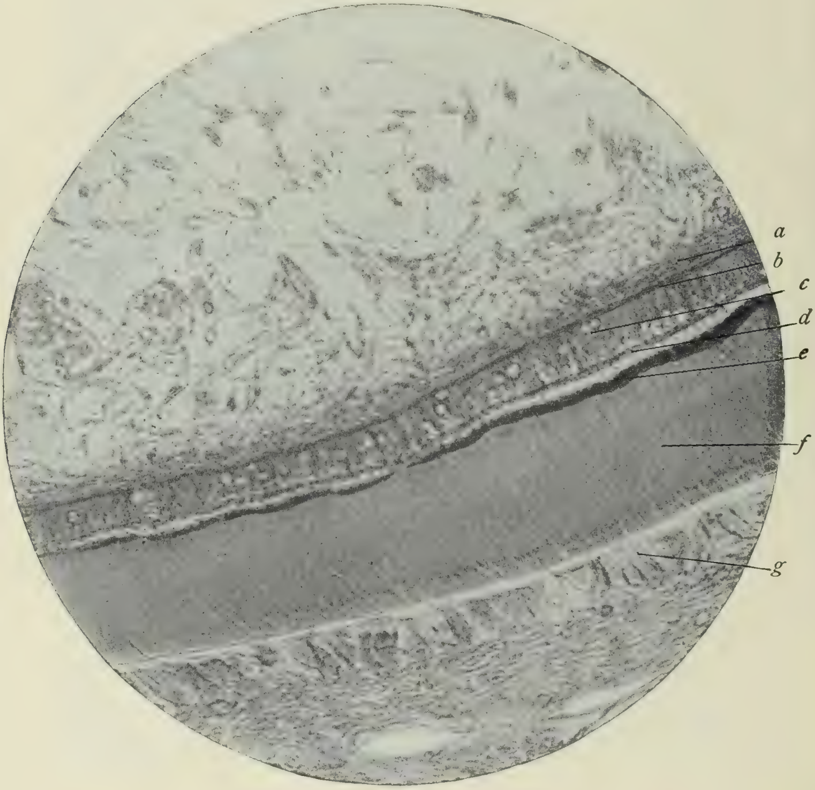
a, Outer ameloblastic membrane; *b*, Ameloblasts showing net-work pattern of plasmic cell-contents; *c*, Strings of plasmic net-work passing through inner ameloblastic membrane; *d*, Dentine; *e*, Reticular nuclei of odontoblasts; *f*, Net-work structure of odontoblasts.

---

* It will be seen that this net-work has little in common with the imaginary "reticulum" of Heitzmann and Bödecker. In the untouched photographs which accompany this paper nature tells her own story of the structure of protoplasm, and it will be seen that the resemblance to the fanciful drawings which Heitzmann has made to illustrate a ridiculous theory is very remote. I cannot but regard the action of the National Association of Dental Faculties, in adopting Bödecker's work as a text-book, as altogether deplorable. It is deplorable because it is certain to greatly injure the scientific status of dentistry in America.

Several observers of distinction, notably Dr. R. R. Andrews and Professor Spee, have described the development of enamel as a process in which the tissue is formed by the deposit of droplets or spherules of calcoglobulin. This view is undoubtedly correct; but as stated by the authors mentioned it does not include all of the phenomena that may be observed. The first important fact to be mentioned concerning the appearance of droplets or masses of calcoglobulin in the ameloblasts is that the process is an intermittent one.

FIG. 30.

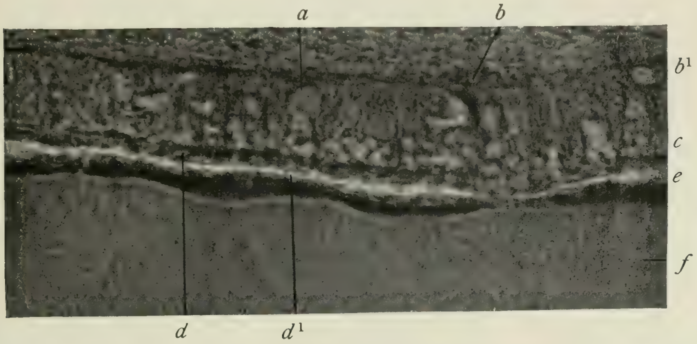


SECTION OF DEVELOPING TOOTH OF EMBRYO LAMB. × 250.

a, Stratum intermedium; *b*, Outer ameloblastic membrane; *c*, Masses of calcoglobulin; nearer the center of the field is a mass apparently emerging from the outer ameloblastic membrane; *d*, Inner ameloblastic membrane; *e*, Enamel; *f*, Dentine; *g*, Odontoblasts.

Sometimes the cells on one side of a developing tooth will be full of these masses, while on the opposite side there are none to be seen. This is shown in Fig. 11 at *f*. Again, the ultimate structure of completely-formed enamel shows that it is built up by the deposit of bodies which are of very nearly uniform size. There is, as we shall see, no uniformity in the size of these masses of calcoglobulin, neither is there anything in their structure which corresponds with that of formed enamel; in fact, under the finest lenses that are made they show as highly refractive masses without definite structure. Although they are usually more numerous at the inner ends of the ameloblasts, next to the forming enamel, they may be seen throughout the entire length of these cells, and I have often seen them lying close up to the membrane which separates the ameloblasts from the stratum intermedium. Occasionally I have espied them when they seemed to be actually in or emerging from this membrane. Such appearances are shown in Figs. 30 and 31. It is possible, and I think highly probable, that this substance, although appearing in the ameloblasts, is really formed in the more specifically secreting cells of the stratum intermedium.

FIG. 31.



A PORTION OF FIG. 28. × 500.

a, Large mass of calco-globulin; *b*, b^1, Masses of calco-globulin apparently emerging from outer ameloblastic membrane; *c*, Inner ameloblastic membrane; *d*, d^1, Globular and oval bodies emerging from inner ameloblastic membrane; *e*, Enamel; *f*, Dentine.

(To be continued.)

ARCH OR SPAN FILLING.

BY WM. A. MILLS, D.D.S., BALTIMORE, MD.

(Read before the Association of Dental Surgeons, Baltimore, Md.)

IN the every-day practice of our profession one of the most annoying complaints of our patients, and one which taxes our greatest skill to relieve or remedy, is the tenderness, hypersensitiveness, and congestion of the gum-tissue filling the interstices or gingival spaces of the bicuspid and molar teeth, often producing reflex nervous action, which is often supposed to be nerve-exposure, periodic neuralgia, etc.

Every one knows these conditions are caused by the crowding and packing of food between the teeth during the process of mastication. In the past we have treated such cases with everything and anything we found would give relief or remedy the evil. But again and again our patients have returned with the same old complaint, and we would give them the same old treatment, until, through our treatment and the often recurrence of the trouble, we have found that the alveolar process becomes more or less absorbed; then follows a "pocket," and in a few years the teeth lose their attachment, become useless, or have to be extracted. The primary cause of this condition is mechanical, and as the old saw goes, "Fight the devil with fire," I have to some extent, in a mechanical way, remedied the evil with what I have named *arch* or *span* filling. These fillings may be simple, or very complex; but with a little experience the most difficult case becomes a simple one.

The chief object of this paper is to show how these fillings are made; and to more fully demonstrate the system I shall exhibit a few models which were used at a clinic given in Washington, D. C., December, 1894. My mode of procedure is as follows: Here are two superior bicuspids which have a space the sixteenth of an inch between them. (See Fig. 1.) In this case I wish to fill with gold. Here I have, on the approximal surfaces, cavities, otherwise I would make them. Prepare the cavities as if they were to be filled separately, in the old way. Be sure to make the anchorages as strong as possible, as they become the abutments of the arch when completed. Be sure to have an orange-wood wedge firmly set between the teeth. Bind the two teeth firmly together with fine German-silver wire to prevent any spreading of the teeth during the packing of the filling-material.

FIG. 1.

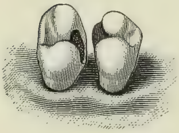


FIG. 2.

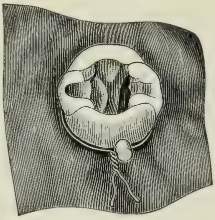
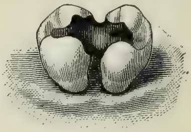


FIG. 3.



Fill the space with oxyphosphate of zinc,* mixed rather stiff, forcing sufficient cement over and against the buccal and palatal surfaces of the teeth to form a matrix.

Before the cement sets too hard, remove all cement from the cavities in the teeth and sufficient from the space to give proper form to the arch, buccal and palatal surfaces of the filling (see Fig. 2), then proceed to fill as though it were a single cavity.

When the filling is completed, remove the rubber-dam, matrix, wedge, and binding-wire, then polish.† (See Fig. 3.)

With an amalgam filling the *modus operandi* is the same, with these exceptions: Gutta-percha may be used in place of the oxyphosphate of zinc; this and the binding-wire are not to be removed until twenty-four hours afterward, when the filling can be dressed and polished. (See Fig. 4.)

Special attention is called to Figs. 5 and 6, in which, owing to the leaning together of the molar and the bicuspid, their masticating surfaces have been thrown out of line with their neighbors, forming

---

* A very dark colored cement is preferred to show the outline of cavities.

† I use sponge or crystal gold to start foundation or arch.

V-shaped surfaces, and, when masticated upon, the food is forced down between the teeth. Arch fillings in these cases have given me the greatest satisfaction.

I wish to have it distinctly understood I do not recommend these fillings for general practice, but to be used only where necessity demands.

Whether I am the originator or not of this kind of filling, I do not know. So far, I have been unable to find any mention of it in text-books or journals. There is a form of filling called the Italian, but that is simply filling the spaces with amalgam from grinding-surfaces down to the gum-tissue.

As to the durability of arch or span fillings I am unable as yet to testify, as I have only been using them for the past eighteen months.* Yet I do not see why they should not prove to be as durable as any filling made in the common way.

The theory that the individual movement of teeth so filled tears the filling out of place I cannot accept, any more than that the individual movement of the teeth to which a bridge-plate may be attached would tear the plate out of place.

FIG. 4.

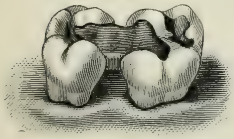


FIG. 5.

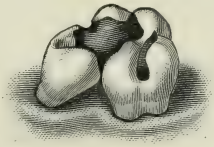
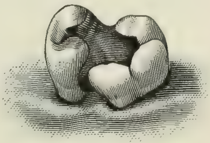


FIG. 6.



I do believe that if the same care and attention is given to these fillings that is given in bridge-work, they will give equally good service and last as long. Now, this is my humble opinion ; others may differ with me, but still we all have one common aim and purpose in view, each striving in his individual sphere to cure disease. If this is achieved, what matters it how we accomplish it? Differences of opinion, when honestly given, only stimulate the toiler after truth to a greater zeal and watchfulness in doing his part well.

Honest criticism makes us bestir ourselves to deeper investigation as to the correct thing to do under certain conditions ; otherwise we might allow ourselves to run in ruts, which in course of time would lead us to indifference in matters that may seem at first sight to be trifling and commonplace, but which upon investigation and experiment lead us to noble success in healing some of the many ills to which the human flesh (and teeth) is heir.

---

* Since writing the above I have had a patient call my attention to the fact that I had made an arch filling for her over five years ago. I examined it closely and found it in good condition.

FOUR CONSOLIDATED DENTAL IMPLANTATIONS.

BY DR. OSCAR AMOEDO,

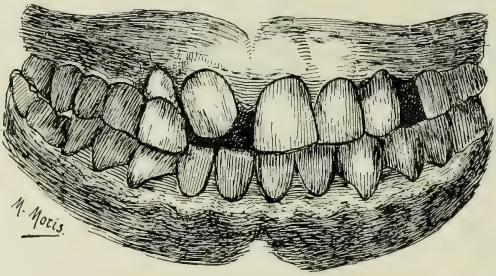
PROFESSOR OF THE ECOLE ODONTOTECHNIQUE OF FRANCE.

About two years ago Miss P. noticed that her two superior right incisors were elongating and aching, though they were not decayed. She went to a dentist, who, she says, having extracted the central incisor, discovered an abscess at the end of the root. He then made her a small plate of rubber holding an artificial tooth.

A few months ago she was greatly astonished to find that her "false tooth" was also elongating. She then noticed a tooth appearing in the spot from which the central incisor was extracted. Ever since she has been unable of course to wear her artificial denture. When she came to consult me, I found her dentition to be as follows:

On the left side, the first bicuspid had lost its crown three years previously. Its roots were perceptible at the surface of the gum. On the right side there was still the temporary cuspid; the lateral incisor was almost gumless, its free margin having been badly worn by pressure from a small metal clasp attached to the plate made by the dentist who had treated the patient before she came to me. Pressure on the gum caused pus to ooze out about the neck of the tooth. In the position of the central incisor her permanent cuspid had erupted.

Fig. 1.

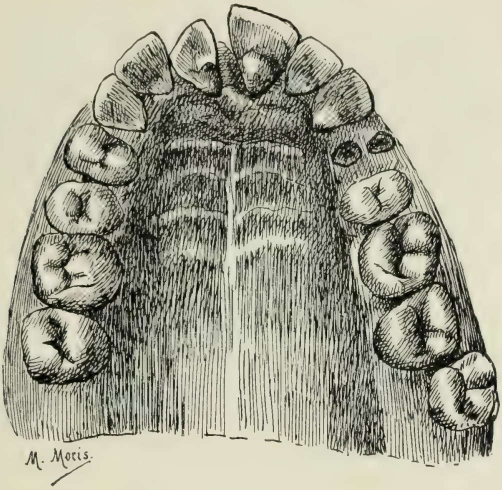


January 6, I began an operation by extracting both roots of the left first bicuspid, and, after having enlarged the alveolus, I implanted in it a bicuspid extracted three days previously from a child for the purpose of regulation.

January 29, in presence of about thirty colleagues who came to honor me with their assistance, I extracted the permanent cuspid, the lateral incisor, and the temporary cuspid. I enlarged the alveolus of the temporary cuspid and reimplanted in its right place the patient's permanent cuspid, after removing the pulp and filling its chamber and canal. I enlarged also the alveolus of the lateral incisor, and implanted a lateral incisor with decalcified root. The alveolus left by the permanent cuspid pointed obliquely from top to bottom and from outward to inward. I made this alveolus vertical, and implanted in it a central incisor with decalcified root. These two incisors were removed from a patient suffering from pyorrhea alveolaris. A ligature of platinum wire solidly held the teeth in their place while the work of consolidation between them and the bone was progressing.

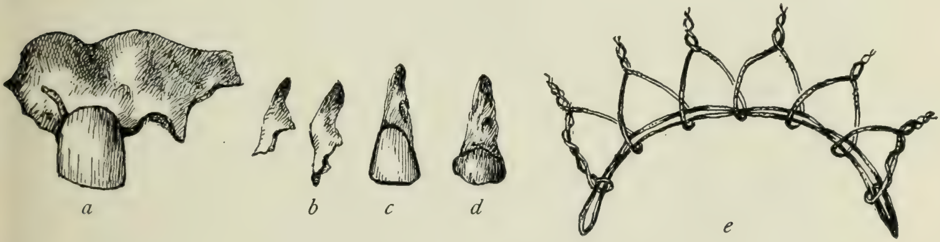
During the operation I made numerous injections of cocain, in consequence of which the patient did not suffer throughout the formation of the new alveoli in the bone. The results have been most favorable. The patient went next day, as usual, to her work. She had neither pain nor inflammation, a clear proof that the operation had been performed with strict antisepsis. I had to tighten the ligatures from time to time, and at the end of three months I removed them altogether.

FIG. 2.



I presented this patient to the following societies: La Société Odontologique de France, session 5th March, 1895 (see *Revue Odontologique*, July, 1895, p. 98); La Société Odontologie de Paris, session 11th June, 1895 (see *Revue Odontologie*, July, 1895, p. 400); La Société de Stomatologie, session June, 1895 (presented to this society by my friend, Dr. Beltrame); the American Dental Society of Europe, session at Boulogne-sur-Mer, 6th August, 1895; the National Dental Congress of Bordeaux, 17th August, 1895.

FIG. 3.



The illustrations are reproduced from pen drawings made before and after the case was treated as described in the text.

Fig. 1 is a view of both dentures in occlusion, showing in the superior jaw the permanent cuspid of the right side occupying the position of the right central incisor, the devitalized laetral incisor, and the retained temporary cuspid.

Fig. 2 is a palatal view of the same case.

FIG. 4.

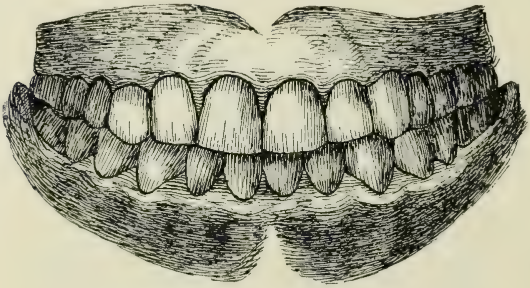


Fig. 3 shows the partial denture, *a*, with the retaining clasp which denuded the root of the permanent lateral which gave support to the plate ; *b*, roots of the left first bicuspid ; *c*, the temporary cuspid ; and *d*, the permanent lateral, all of which were removed ; *e* is the arrangement of the platinum wire retaining splint.

Fig. 4 shows the denture in occlusion after treatment by implantation, as described.

CATAPHORESIS FOR OBTUNDING SENSITIVE DENTINE.

BY HENRY W. GILLETT, D.M.D., NEWPORT, R. I.

(Read before the American Dental Association, August 8, 1895.)

QUITE recently our dental journals have contained references to cataphoresis as an aid for bleaching discolored teeth, but for several years there has been complete silence on the score of a much broader field which is open to it, namely, the prevention of that suffering which has given us all so many uncomfortable hours in our professional lives, and made many of those suffering under our ministrations feel that the torture-chambers of the Spanish Inquisition would be a welcome relief.

Is there any one pain that has been more dreaded by the civilized race than the pain from the sensitive tissues of the human tooth, when it becomes necessary to treat those tissues surgically?

Is there any one object for which our profession has sought more earnestly, and less successfully, than it has to find a generally applicable means for preventing this pain?

We have striven unceasingly with caustics, with desiccants, with anesthetics both local and general, with administration of drugs and applications of washes, but with all our strivings we hear it constantly reiterated in our discussions, that the keen excavator and the firm touch are our main reliance.

We have been able to soften the blow sometimes, but very generally the profession seems to have come to feel that prompt and heroic measures are best, and have prepared themselves for action on these lines.

In common with the rest of the profession I have many times had cause to be grateful, in individual cases, for some of the above enumerated aids, and I would by no means discredit the bridge when it has safely carried me over a chasm ; but, after many trials and many failures, my sense of relief in having a means for the control of sensitive dentine which seems to be universal in its application, and the relief afforded to some otherwise untreatable cases has been so great that I am anxious to have the knowledge of the success of this method more widely spread than it now is, to the end that human suffering may be made less. As I have intimated, in my own practice this step in advance has been made by using cataphoresis.

So well recognized an authority as Professor W. J. Morton has recently defined cataphoresis as meaning "the movements of fluids, together with the substances they may hold in solution, from the positive pole of electrodes conveying a continuous current in tissue, toward the negative pole."

Dr. Frederick Peterson opens his article on cataphoresis in Bigelow's "International System of Electro-Therapeutics" with these statements : "From a medical standpoint we understand by cataphoresis the introduction of medicaments by means of electricity into the body, through the skin or mucous membranes. It seems to be a purely physical process, and has nothing to do with electrolysis."

I would add to this definition, so as to include the teeth as a point of entry. The current, then, carries with it fluids exposed to its action under suitable conditions. Here is the missing factor which shall enable us to carry our local anesthetic into the dentine, as it has never gone before,—the beneficent force which has already done so much for us in other fields, which we may again harness for our needs, and make it carry with it, at our command, the cocain solutions we have so long tried to coax into the dentine.

Reference should also be made to an article on this same subject by Dr. D. F. McGraw, in the *Dental Review* for 1887 or 1888, and one by Dr. A. C. Westlake, in the DENTAL COSMOS for November, 1892.

I learned of Dr. McGraw's article too late to consult it, or even find just when it appeared. Dr. Westlake's article contains very little information.

Professor Morton's recent article in the COSMOS, describing in detail experiments demonstrating the process of cataphoresis, make it unnecessary to go over that ground again.

When cataphoresis is used on the *living* tooth, however, it is inadmissible that anything like the current strengths which Professor Morton found necessary for bleaching should be used.

Professor Peterson's article contains many points of interest, but I will not take your time to quote his experiments, preferring to quote some cases from practice, showing what may be done in the sensitive tooth.*

---

*At this point the essayist quoted Dr. Peterson's summing up of his experiments with cataphoresis (which had been kindly furnished him by Dr. S. Freeman) as follows :

How shall we use and control this power, so ready to aid, yet so prone to escape us if we do not guard it? It must be *fully* under control.

Apparatus which may be used for cataphoresis at other points is of little use in the living tooth, because the living tooth is much less tolerant of the current. It responds promptly to currents imperceptible in most other tissues.

The apparatus must be so arranged that we may begin by applying an imperceptible current, and increase it by minute gradations till we reach a point enabling us to attain our object. This point need not be high; a fraction of a milliampère actually passing through the tooth for a sufficient length of time will accomplish the purpose. If, however, the subject is not too sensitive to the influence of the electric current, one to two milliampères will do the work quicker, and even three or four may be reached in individual cases without discomfort to the patient. This quantity of current is reached in only a small proportion of cases, however. Note that the quantity of current specified is that actually passed *through* the tooth; the capacity of the apparatus needs to be much greater in order to force this quantity through the tooth and other tissues.

The source of current may be any of the commonly used commercial electric power systems. The current used by the essayist is the Edison 110-volt, and this particular adaptor, or fractional volt selector, is suited to that current.

The manufacturers, "The Electro-Therapeutic Company," 32 East Twenty-third street, New York, say they can furnish equally satisfactory appliances for any system, or supply suitable batteries, if other sources of power are unavailable.

One of the most essential points to practical success is to begin with a current too weak to cause any annoyance to the patient, and increase it as the patient will permit. As the cocain begins to penetrate, the current will be felt less, and may be increased without discomfort for the patient.

The minimum time for application has been, so far, six to eight minutes; many cases require more time, and these can only be discovered by testing the cavity. By long applications a tooth may be so benumbed as to allow it to be cut to pieces without pain, if it is desired to do so. In using, apply current gradually, avoid sharp changes in quantity or voltage. When application is completed, decrease the current in the same way, as a sudden cutting off will result in some shock to the tooth.*

Never allow the current to pass through a metal filling to the tooth, as this causes pain. Insulate such fillings when necessary with gutta-percha. Twenty to thirty per cent. solutions of cocain prove satisfactory for use in sensitive dentine.

The effect seems to penetrate but a short distance at first; if this layer is cut through, a second application may be made.

"The current alone does not produce anesthesia at either pole, although the anode has a transitory soothing effect over painful foci. A watery solution of cocain applied to the skin is not absorbed, does not produce anesthesia, except, perhaps, after an indefinitely long period. A watery solution of cocain *is* diffused through the skin and subcutaneous tissues by the anode, but not by the cathode."

*This is found to be unnecessary with the latest improved selector.

Always apply the platinum-pointed positive electrode to cotton in the cavity saturated with the obtunding solution. The negative wet-sponge electrode may be applied anywhere on the surface of the body; the neck or the face is a very satisfactory place for applying it. It is desirable that the current should have as short a distance as possible to travel through the tissues. Theoretically, the mucous membrane of the mouth would be a good place for the negative electrode, but it is less easy to prevent leakage of current when it is placed there, and its application at that point is more disagreeable for the patient.

I have confined myself, in the foregoing, to statements of what I have actually accomplished in my own practice.

I believe the field in which cataphoresis can most frequently and best serve our profession is the one in which I have been working. My experience with it in this field, however, leads me to expect that its applications will be numerous. For instance, it is as yet an open question in my mind whether I will attempt to treat the next case of sensitive dentine, exposed by abrasion, that presents itself to me, by cocain cataphoresis followed by actual cautery, or by cataphoric applications of caustic solution to those surfaces.

I anticipate being able to treat pericementitis, incipient abscess, and chronic abscess without fistula, by forcing antiseptic and stimulant applications to the seat of trouble by cataphoresis.

May we not be able, even, to treat irritated and inflamed conditions of the dental pulp itself by this means? To me it seems a reasonable probability, and to present an attractive field for experimental research.* It has enabled me to say to my patients that I can prevent all pain in preparing sensitive cavities. Gentlemen, I commend this method to your attention.

With your permission, I will quote a few cases from practice.

Case A, Mr. N., aged twenty-five, right superior second bicuspid, cavity quite sensitive. Treatment, cataphoresis for ten minutes with twenty per cent. solution cocain, not quite one milliampère of current passing through the tooth at the end of treatment. Result, absolute freedom from sensitiveness to excavator or bur.

Case B, Mrs. H., aged forty, left superior bicuspid, large approximal filling, history and contemplated treatment such as had led to a decision to destroy the pulp. To do this it was more convenient to approach the pulp through the anterior cavity. The dentine was found too sensitive to permit drilling. Cataphoresis for fifteen minutes with thirty per cent. cocain, then drill directly to the pulp, which was found much receded. The first notice that the pulp had been reached by the drill was from hemorrhage, and not from pain. In this case a further application was made and pulp removed painlessly.

Case C, Mr. C., aged thirty, left inferior second molar, very large corono-mesial cavity. The patient refused to allow shaping of cavity, because of sensitiveness. Cataphoresis for fifteen minutes with twenty per cent. cocain. Result, entire freedom from sensitiveness, except in one corner near cervical margin.

---

* Since writing the above, my attention has been called to a paper presented before this association and printed in the Transactions for 1891. It was presented by Dr. John S. Marshall, and was entitled, "Electricity as a Therapeutic Agent in the Treatment of Hyperemia and Congestion of the Pulp and Peridental Membrane." It deals rather with the effects of the current itself than with the results obtained by cataphoresis.

Case D, Willie M., aged thirteen, mesial cavity in inferior first molar, very sensitive. Cataphoresis with thirty per cent. cocain for ten minutes. Result, complete anesthesia of dentine for some distance, but a second application for six minutes was needed for shaping the retaining grooves.

◆

CORRESPONDENCE.

NITROUS OXID AND OXYGEN.

10 George Street, Hanover Square W.
London, December 14, 1895.

To the Editor of the Dental Cosmos:

Sir,—I have read with much interest Dr. Thomas's paper on "The Anesthetic and Asphyxiating Effects of Nitrous-Oxid Inhalation" in the November number of the Dental Cosmos; and as this paper led to a discussion in which reference is made to certain work I have done in regard to the administration of oxygen with nitrous oxid, I venture to ask your permission to make a few remarks.

In the first place, I should like to thank Dr. Thomas and those who discussed his paper for so kindly referring to me and the method which I employ.

In the next place, it is exceedingly gratifying to me to find that there is a steadily increasing tendency among American dentists, and I believe among American medical practitioners, to abandon those methods of producing nitrous-oxid anesthesia in which the asphyxial element plays a conspicuous part.

The vast experience which Dr. Thomas has had makes his observations and conclusions of great weight. The chief point upon which we differ is that he prefers air as an oxygenating agent, whilst I prefer oxygen itself.

There is no such thing as finality in the progress of anesthesia, and I have no doubt that Dr. Thomas, like myself, looks forward to even greater advances and improvements. I have tried nitrous oxid and air, and I have found it inferior to nitrous oxid and oxygen. But I am quite prepared to alter my views if the evidence at my disposal is sufficiently strong.

There may possibly be certain details in Dr. Thomas's method of giving air with nitrous oxid which are unknown to me. I have been for the past year engaged in administering, by means of an accurate percentage gasometer, various mixtures of air and nitrous oxid, and I hope during next year to publish my results.

As far as I have gone I have found air inferior to oxygen, at all events for producing anesthesia for dental operations, because the nitrogen present renders the oxygen less readily available than when the latter gas is present free from nitrogen. It seems to me that the nitrogen is useless for anesthetizing purposes save in the absence of free oxygen, or when the percentage of free oxygen is so low that for all practical purposes it is absent. Under these circumstances nitrogen, as is well known, will produce anesthesia ; indeed, in my work on "Anesthetics" I have reported numerous administrations.

When we have oxygen, free from nitrogen, at our disposal during the administration of nitrous oxid, it is comparatively easy to increase or lessen the oxygenating element or the anesthetic element. I will not, however, enter more fully into this particular subject here, as I shall have many interesting points to bring forward later on.

Before concluding, let me draw attention to an erroneous statement on page 959 of the November number of the COSMOS. Dr. Darby seems to imply that in addition to the administration of nitrous oxid and oxygen by means of my apparatus, there is need for an assistant. This is not so. Possibly when Dr. Darby did me the honor to witness my administrations at the Dental Hospital there was some one present, as there often is, who assisted in some way or other, without his services being really necessary. When I say that the apparatus which I use (including the three cylinders for the two gases) is readily packed away in a hand-bag, and that I never by any chance ask the operator to assist me in the administration, it will be clear that Dr. Darby is under a misapprehension.

One of the great points I have borne in mind in devising the apparatus is that it should work as easily as an ordinary nitrous-oxid apparatus, and that it should be almost as portable. Whether I have been successful, others must decide. I should very much like the apparatus to be even simpler than it is, but at present I do not see how this can be done.

I am, sir, yours obediently,

FREDERIC HEWITT.

PROCEEDINGS OF SOCIETIES.

PENNSYLVANIA STATE DENTAL SOCIETY.

(Concluded from page 1042, vol. xxxvii.)

EVENING SESSION, JULY 10 (Continued).

DR. C. V. KRATZER, of Reading, read the following paper :

DENTINAL DEHYDRATION.

Strictly considered, from a chemical standpoint, the appropriateness of my title to the subject-matter which follows may be questioned, for, as in chemistry a hydrate is a compound of water with an oxid, so to dehydrate would mean to free the water and leave the oxid. The term for my purpose, however, is convenient, and by considering normal dentine in the sense of a hydrate, the pertinence of its application here is obvious. So that I am sure I shall need no further apology for its adoption.

Every practitioner of dentistry, or at least every one who practices the art of substitution in the preservation of living teeth, knows the value of dryness of a cavity as a condition essential, at least, to the one great purpose in view.

The means employed are not the same by all, but all careful operaors more or less thoroughly remove the moisture from a cavity before inserting a filling, no matter what the character of the latter, excepting, of course, those rare cases which limit the choice of methods and materials and, perforce of circumstances, seem to justify sub-aqueous manipulation. Hence I shall not pretend to present anything new, either as to means or results. It is mere corroborative evidence, so to speak, which I shall give, of observations common to most, perhaps all, of you.

Not unfrequently, by the employment of a single means, more than one salutary end is attained. And so, when even the crudest operator applies absorbent cotton, spunk, or bibulous paper to a tooth-cavity for the purpose alone of removing the saliva which obstructs his vision of the parts, depending, of course, upon the approximation to thoroughness with which the cavity has been freed of moisture, and aided in a degree by the atmosphere, his subject gets the benefit of diminished suffering in the preparation of the cavity for a filling. The more thorough the dehydration, the more beneficial the result in immunity from pain during the process of excavating. The progressive dentist, therefore, employs means more especially adapted to the expeditious expulsion of moisture for the several purposes auxiliary to that of tooth salvation.

The main purpose which we will now consider, and which has already been broached, is that of obtunding the sensitiveness of dentine. We assume, of course, that which our daily experience verifies,—viz, that normal dentine *is* sensitive (the rash assertion of Dr. Frank Abbott, of New York, to the contrary notwithstanding), and agree with Dr. Peirce that, if it is not, then we never strike normal dentine. It matters little, if at all, however, from a practical standpoint, whether *normal* dentine is or is not sensitive ; sufficient for our purpose is it to recognize the almost universal sensitiveness of the dentine involved in our operations upon teeth with vital pulps.

From time to time various agents have been employed as dehydrants toward this end. Alcohol, ether, chloroform, chlorid of ethyl, etc., because of their affinity for water and extreme volatility, have been and, I presume, still are, to some extent, used with varying degrees of success as dehydrants ; but whether the diminution of pain in excavating, following their use, is due to the extraction of moisture, or whether the anesthetic properties of the agents themselves produce the partial relief which follows, I am not prepared to say. In the case of alcohol, which is a slight coagulant of albumin, whatever benefit follows *its* use may be due to *that* property, as with carbolic acid, creasote, chlorid of zinc, some of the essential oils, and the other coagulants in more or less common use with the profession.

As to ether, chloroform, chlorid of ethyl, and liquids of like or similar volatility, the very property upon which their value as dehydrants depends renders their use highly objectionable in most cases of dentinal sensitiveness, on account of the decrease of temperature produced by their rapid evaporation ; the sensation of cold in some cases being so extreme as to be almost intolerable, so that with these agents the end does not seem to justify the means, especially as it is of doubtful benefit and leaves much to be desired. The same may be said of cold air, which, when applied with sufficient persistence, *will* produce dryness, but the pain of its application is scarcely less than would be that of excavating without dryness.

Were time of no consideration with the dentist and his patient, a sufficient period of that commodity alone, in an ordinary atmosphere, after the adjustment of the rubber-dam and the removal of superficial moisture, would suffice to produce all that could be desired in dentinal dehydration. Illustrations of this we have all observed in cases where we have had occasion to fill two adjoining cavities at the same sitting, the preparation of one of them being left until the other was completed ; the comparative, and sometimes absolute, freedom from pain attending the preparation of the second cavity being often so marked as to elicit special comment from the patient.

Time and exposure to dry air is the natural process of desiccation, but, as time with the busy dentist is too valuable a commodity to waste upon a purpose for the attainment of which a cheaper and more rapid means is at hand, we adopt the ready artificial substitute.

Apparatus, either special or improvised, for the injection of heated air are at hand in every dental office. A common rubber-bulb chip-blower, by drawing the flame of an alcohol lamp or Bunsen gas-burner, preferably the latter, into it, will answer the purpose tolerably well when more approved means cannot be had. Various apparatus especially adapted have been devised. Of these, the Richmond hot-air syringe has attracted considerable attention, because of the continuous current of air produced by means of its dual rubber bulbs. Aside from this feature, which is an advantage, the instrument possesses no merit, as a hot-air syringe, superior to those which have been in general use for some years ; the principal objection to all of them being that, because the syringe is first heated before the air is used, the first blast of air thrown into the tooth is the hottest, each subsequent one being cooler until the instrument is re-heated. The shock thus produced by this sudden change of temperature is most unpleasant, and, when incautiously applied, decidedly painful instead of soothing.

A modification of the Richmond syringe, or rather an addition to it, in the shape of a small alcohol lamp underneath the metal bulb which it heats, would seem to obviate this objection in the hands of one who might be expert enough in its handling to avoid the seeming danger to himself and patient.

Dr. Lennox, of Toronto, a few years ago introduced an apparatus in the shape of a syringe, which, instead of atmospheric air, was supplied by nitrous-oxid gas from a gas cylinder. Gas and air were also sometimes, I believe, combined in the instrument, which has had its indorsers ; but, as it was, I believe, intended to produce an anesthetic effect by contact of the gas, rather than by dehydration, it does not properly call for mention here.

Dr. Flagg, I believe, introduced the use of heated burnishers for evaporating the moisture of dentine ; but more recently he has discarded these for the dento-electric cautery, the loop of which is passed back and forth over the dentinal surface until the desired degree of dryness is attained.

Electricity, the great mechanical benefactor of the age, has come to our aid in this as in other departments of practice ; and at this day there is, I may say, no more convenient and potent means of producing artificial desiccation than that of the electrically-heated air-syringe or injector.

My own experience with the various appliances on the market has not been exhaustive ; but I have used a considerable number of them, more or less extensively, with but little success, as obtunders, until I adopted electricity ; and, while it would be too much to say that I have been uniformly successful in producing entire insensibility to pain with the electric hot-air injector, my success with it has been so far in excess of that attending the use of methods previously employed that I feel warranted in denominating it a most satisfactory means.

By way of illustration of what may be accomplished in diminishing dentinal sensibility, I will cite a few cases in practice :

Case 1.—Mrs. L., a highly nervous and hysterical patient, for whom I had on a previous occasion filled a small cavity in the left superior cuspid with oxyphosphate of zinc, because extreme sensitiveness, even with the use of coagulants, would not permit sufficient excavating for any other material, applied for treatment of cavity on mesial surface of superior lateral on same side. Cavity shallow, but with considerable surface extension. Sensitiveness so extreme that contact of absorbent cotton caused great pain, and that of instruments would positively not be tolerated. Patient became greatly excited, and declared she could never endure any operation on that tooth. I pacified her as best I could, and applied the hot-air current from the electric injector, continuing it for a few minutes, after which, without a second application of air, the cavity was prepared without a tinge of pain, and filled with gold to the perfect delight of the patient. Afterward other teeth for this patient were treated in the same way, with the same results.

Case 2.—Labio-cervical cavity in the right inferior cuspid, with a condition of acute sensitiveness not uncommon in such cases. Two applications of about one minute each, at different stages of the operation, of the heated air, rendered the process of excavating quite painless, with profuse expressions of satisfaction from the patient.

Case 3.—Child of about ten years. Several anterior approximal cavities, with the usual sensitiveness of such cases, excavated and filled (with a plastic, of course) without any discomfort after the hot-air treatment.

These three cases are cited because they were the first ones in which this treatment was used. Since then I have had others in which the benefits were quite as marked ; some, too, in which but partial relief could be gained, and one or two in which no apparent good could be accomplished.

The degree of success in a given case is, of course, dependent upon local and sometimes, also, upon systemic conditions. The extent of disintegration has an important bearing ; and in an inverse proportion to its proximity to the pulp is the benefit derived from the warm-air current. Where we have almost an exposure, the application of air above the natural temperature of the body is sometimes hardly tolerable, and, unless we have some definite means of regulating the temperature for adaptation to the various local conditions, we can expect but little success in these cases. With the electric syringe the graduated rheostat, together with valve on the syringe, affords such means (the common current variations from a well-managed light and power system of one hundred and ten volts affecting it but slightly), and with experience and careful observation the temperature can be regulated almost to a nicety. I find that, in the average case, by delivering the air to dentine at ninety-eight and gradually increasing it, in about forty-five seconds or one minute, to one hundred and twenty degrees Fahrenheit, at which it may be continued for from one to three minutes, repeated later if necessary, the most satisfactory results are to be obtained. A lower temperature, longer continued, will, of course, answer as well. In some cases one hundred and thirty degrees is not too high ; but normal dentine will hardly tolerate *more* than that. The force of the air is, of course, also important, and, when the hand-bulb or foot-bellows is used, is entirely under control.

As to systemic conditions, any departure from a state of health might affect the dentine by aggravating its tenderness and repelling remedial treatment. Especially is this noticeable in anemic patients. This is also, as is well known, often the case with the teeth of pregnant women, especially when in an advanced stage.

Temperament, without doubt, is a factor upon which are often dependent the varying degrees of success in this as in other treatments of human tissues ; and from observations,—which, however, are incomplete,—I am inclined to the deduction that : In the two extremes of temperament, the lymphatic is more susceptible to treatment than the bilious. In fact, extreme vascularity seems to invite successful treatment I am unable to give a physiological reason for this, further than to suggest that possibly the larger tubuli in the dentine of the former more readily give up their moisture,—which is the conducting medium of sensation,—than the smaller tubuli in that of the latter, upon the same principle as vegetable fiber with large pores, such as pine, will dry more quickly than will harder and more close-grained fiber, such as boxwood and ebony. But this is a mere passing thought.

The question might suggest itself, whether the removal of water from the protoplasm of the dentinal tubuli of teeth with living pulps does not inflict a permanent injury to that organ, which may eventually result in its death. Whether it does or not I am unable to say, and investigation in the line of determining knowledge as to such a consummation would be attended with serious difficulty, in view of the various other conditions which might produce death of the pulp under a filling. But, when we consider the relative dimensions of the two,—the average diameter of the former being but the one-three-thousandth part of an inch,—and the consequent slight anatomical relations which the capillæ of protoplasm within the tubuli bear the pulp from which they ramify and receive their support, and to which they in no wise contribute sustenance, together with the fact that, within the average limits of a carious cavity, but a small proportion of these protoplasmic filaments are affected, and these rarely to the very surface of the pulp, it seems hardly necessary to apprehend any danger of injury to that organ, unless the process of desiccation is carried to an improbable excess.

The dread of pain and the introduction of methods tending to lessen the pain in operating upon living, sensitive tooth-structure, with a view to its preservation, may or may not, as Dr. M. L. Rhein, of New York city, asserted at the Columbian Dental Congress in 1893, be "an evidence of physical degeneracy. A degeneracy that means," as he says, "a departure from that Spartan-like character which was so much admired centuries ago." But this repugnance to pain is, nevertheless, a condition which we as dentists must face. No amount of flowery rhetoric will remove it; and, after all, it is human and natural. It is instinctive. Sensation is the automatic signal by which the mind is apprised of the first touch of injury to the tissues. And, in more or less prolonged operations upon the teeth, as well as in general surgery, it is not only right and proper, but humane, to silence this signal because the mind's interference is not desired.

As for the old Spartans: Mentally weak and narrow, their character consisted mainly of a calculating selfishness. Their boasted valor was limited to defence against the invaders of the narrow territory of their mountain confines, from which they never had the courage to venture in war unless forced to do so. At home they were invincible soldiers, by the operation of that first law of nature —self-preservation. But neither history nor archeology informs us that *ever* a Spartan or a Trojan had a tooth filled. If it did, then we should also be informed of a dead dentist lying nearby. Surely such is not the character we, as a profession, wish our patients to emulate. But this is a digression.

The other dental use of dehydration is in the preparatory treatment of the root-canals of pulpless teeth. The wisdom of a certain degree of desiccation of these parts is now generally recognized and the means employed are even more diversified than are those in use for obtunding purposes, embracing all, or nearly so, of those mentioned in the former connection, or modifications of them, and others of special adaptation for use in this department. Of this, latter class I shall refer briefly only to a few which seem either unique or meritorious.

At a joint meeting of the First and Second District Dental Societies of that state, held in New York city a few years ago, Dr. Timme, of that city, exhibited a new method of drying pulp-canals by means of potassium and tin mixed together. The mixture is introduced with a fine platinum wire, and immediately upon coming in contact with moisture the potassium will explode, producing a great deal of heat. Dr. Timme claims to have tried it in a number of cases, and says it is not painful and is very effective. (The above is taken from the report of clinics at the meeting referred to.)

Dr. Francis Eschauzier, a Mexican dentist, pumps hot air into root-canals, by means of a foot-bellows, for a period of one hour. This, he says, he generally accomplishes in two sittings, allowing the patient a rest of twenty minutes between, and sealing in the cavity, meanwhile, with gutta-percha, cotton saturated with absolute alcohol. This he regards as "the most reliable and only way of preparing the tooth before proceeding with any of the methods now in vogue."

One hour certainly seems a longer time than necessary for this purpose; but, if patient and patience hold out, it *may* be erring on the safe side, provided the temperature is not too high. It would seem that a low temperature would accomplish much in the direction desired in the time stated. There is, however, a limit to the prudent application of hot air, even in a senseless pulp-canal. And too much of it, or too high a temperature, besides the distracting effect upon a highly nervous organization and the possible pericemental irritation, might produce such perfect desiccation as to affect the integrity of the structure. Dr. G. V. Black, of Jacksonville, Ill., in an exhaustive article published in part in the May number of the DENTAL COSMOS, entitled, "An Investigation of the Physical Characters of the Human Teeth in Their Relation to Diseases and to Practical Dental Operations, together with the Physical Characters of Filling-Materials," speaking of the brittleness found in some specimens of teeth which he was preparing in the pursuance of his investigations, has this to say: "This breakage has been so prominent in the teeth I have handled recently as to give me the impression that, with pulpless teeth in the mouth, there is serious danger of injury by some of the processes of hot-air drying. In teeth with living pulps, one could not expect that the drying would be of sufficient depth to endanger the teeth by checking; but pulpless teeth part with their water very readily, and the danger is correspondingly increased."

This note of warning from so eminent an authority as Dr. Black should not go unheeded.

Dr. C. M. Johnson, of Chicago, uses alcohol spray forced into the canals by means of a foot-blower, and claims to be able, by its prolonged continuance, to thoroughly desiccate the root and devitalized pulp within; so that the latter, dried and toughened, can be readily removed.

Dr. Carl T. Gramm, of Keokuk, Iowa, has, a few years ago, devised a novel method of drying and filling pulp-canals by means of an electrode and his copper canal-points, the latter being graduated in sizes to fit, as is claimed, any canal. One of these is selected to fit the case in hand, and inserted into the canal with the large end protruding. To this is held the loop of the electrode brought to a bright red or white heat, which is conducted through the copper point, and, as he says, "expels the moisture with a hissing sound." Dr. Gramm claims that by this means otherwise inaccessible portions of even tortuous canals are readily reached, and that, should any vestige of pulp or matter of any kind remain within the canal, this will be desiccated and sterilized, and, lastly, permeated by the filling-material, which is wax or paraffin, carried to the apex by a reheating of the copper point, which is then left in position.

This, indeed, seems like a rational method of treatment; although it seems to me it would be better to avoid that "hissing sound" of the escaping steam by using a lower degree of heat on the electrode at first, on account of the apparent danger, in occasional cases, of the steam hissing through the wrong end of the canal.

As good results, I think, as Dr. Gramm gets with his electrode and copper points, can be obtained with the electric hot-air injector and electric root-canal dryer. At least the results have been quite satisfactory to me. After drying the cavity and canal as thoroughly as possible in the usual way, I use the injector without much regard to temperature. But 160° Fahrenheit for from three to five minutes is quite sufficient. When it gets above that the automatic signal service will operate, and here it is useful. I then follow with the electric dryer, the silver point of which being an excellent conductor, carries the heat to its extremity and expels all moisture with which it comes in contact by converting it into vapor. Three or four well-selected sizes of these points I find quite sufficient in variety for satisfactory results in the general run of cases. By a gentle upward or downward, as the case may be, pressure of the instrument, the point will gradually advance in the canal as the drying progresses. The time required is about the same as that for the injector, but judgment and experience furnish the best guide as to that in individual cases ; the minutia of this, as with other operations, varying in direct proportion to those of the conditions presented.

Wherever practicable, all pulp remains should, of course, be removed ; but where this cannot be done, they are necessarily so minute that their sterilization by means of heat and subsequent saturation with eucalyptus and iodoform, or other dressing, is not a difficult matter.

In the class of infinitesimal canals, which are sometimes so difficult to locate, I do not hesitate to use the drill as an assistant in finding and enlarging the orifice for the better egress of the dryer point, as well as the broach. But most generally the hot air will so dry the floor of a cavity as to reveal all the canals.

Dr. W. R. Blackstone, of Manchester, N. H., has such faith in the efficacy of desiccation of pulp-canals that, after accomplishing this to his satisfaction and dressing the canals with eucalyptus and iodoform, he leaves them without any filling at all. Some others of us, perhaps, though not designedly, sometimes do the same.

I have endeavored, in the foregoing remarks, to avoid digressing into a general consideration of either of the subjects of dentine obtunders, or the general treatment and filling of pulp-canals. This avoidance in the case of the latter subject, which though hackneyed, is engaging, was not easy ; and with relation to it, in a few instances, it might seem better to have thus digressed. This, however, would have been foreign to my purpose, which is not to advocate or make converts to any method of ultimate treatment, but rather to consider the one item of dehydration or desiccation as a preparatory procedure, and *in* it present for discussion a subject which, although not new, has not, to my knowledge or recollection, heretofore been dealt upon in detail nor engaged the attention which its importance seems to merit, and which would tend to enlighten us more fully in its minutiæ.

Discussion.

Dr. E. C. Kirk. I am very much pleased with the paper. It is very instructive and very suggestive.

The question of dentinal dehydration—I refer now to teeth with living pulps—can be viewed from two standpoints. One, for the purpose of obtunding excessive sensibility ; the other, as an aid in the mechanical operation of inserting fillings. I do not believe that absolute dryness in a cavity, preparatory to filling it, is necessarily a factor in the subsequent integrity of the filling, at least to the extent that we have been inclined to so regard it.

It is, of course, a necessity for the introduction of gold upon the cohesive principle, but it must be evident, if it were possible to introduce a filling of gold or any material into a cavity so that the cavity is perfectly stopped, that we have accomplished all we can do. I think the proof of that rests in this, that immediately after the filling is inserted and the tooth is subjected to the action of the saliva in the mouth, it reabsorbs sufficient fluid to make it as moist as it would have been if we had simply wiped it out carefully with an absorbent before filling. A filling that is a moisture-tight plug, if such can be inserted under moisture and made mechanically perfect, should be as good a preservative as one which has been inserted with the absolute exclusion of moisture and where the cavity-walls have become moist afterward.

I believe there is food for thought in the note of warning which Dr. Black has raised with regard to the excessive dehydration of the dentine as a possible source of weakness in tooth-structure. We see in teeth extracted from the mouth a tendency to become brittle and break. I have no doubt that condition is more or less liable to be produced by the artificial production of dryness in cavities.

There can be no doubt of the great value of dehydration as an obtundent for sensitive dentine, but it is questionable whether it is necessary to produce insensibility of the dentine exclusively by the dehydration method. For example, where a current of warm air is blown into the cavity and the current of air is loaded with some medicated vapor, we simply have a substitution of the moisture, at any rate we don't get the same sort of dryness that we do where a current of dry air alone is used. Where cinnamon oil, alcohol, ether spray, or any of these substances are injected along with the vapor, I question very much whether the effect produced is due to the affinity which these medicaments have for moisture. It has been so reported, but I think it is doubtful whether these agents, in themselves, aid in drying out the teeth.

With regard to the use of hot air as a means of treatment for putrescent canals, pulp-chambers, canals of teeth, while it is serviceable up to a certain point, I doubt the extreme efficacy that has been attributed to it. There are other methods which I think are more desirable. The method advocated by Dr. Eschauzier, of Mexico, it seems to me, carries the thing to an extreme. The idea of pumping hot air into a pulp-canal for an hour is something they may do successfully in Mexico, where they always have another day,—to-morrow,—but if you have to treat a number of these cases consecutively, there are commercial considerations, questions of time value, that we have to consider in an ordinarily busy practice, that would exclude such a method ; and, after all, why is it necessary ? It seems to me that the prime result to be achieved is to eliminate by some process the putrescent products of pulp decomposition from the canal, and that can be done thoroughly by the use of chemical disinfectants, such as the alkaline solutions of hydrogen dioxid or sodium dioxid.

My habit in these cases, whether of immediate pulp extirpation or putrescent cases, is to flood the cavity with ethereal solution of hydrogen dioxid or aqueous sodium dioxid. I think an object lesson that would be valuable to every believer in immediate root-filling would be after removing the pulp to flood the canal with hydrogen dioxid in ethereal solution, and consider the result. If any man believes it is safe to stop up a canal with as much animal matter contained in it as is manifested by the action of pyrozone upon such a canal, I think after testing it with pyrozone he would be likely to change his view in regard to it. With this animal matter thoroughly removed it seems impossible for infection to occur.

Since I have adopted this principle, thoroughly removing by chemical action the contents of the tubuli, whether putrescent or non-infected, I have had better average results than by any process depending upon desiccation and allowing the contents to remain, even though treated antiseptically, because there is always a possibility that in the course of time the small amount of antiseptic used will spend its force, and the contents of the dentinal structure become reinfected through the medium of the general circulation. I would therefore advocate the method of entirely removing by chemical means all the animal matter, rather than desiccation.

I think Dr. Kratzer has made a strong point in favor of desiccation in the specific control of temperature by the electrical current. There can be no doubt that the ordinary bulb-syringe, where the blast of air is applied at its maximum temperature and then cools down, is a very painful proceeding. I have met that difficulty myself, and a number of times have attempted to overcome or modify it by the gradual approach of the hot-air blast to the cavity. It should be applied moderately at first, and at considerable distance.

With reference to the current of nitrous-oxid gas suggested by Dr. Lennox, I made a number of experiments, and there did seem to be a slight difference in favor of the nitrous-oxid blast. I should think that was possibly due to the known power which nitrous oxid has to dissolve in water, or we might say dissolve water in itself, which would increase its dehydrating power. Its obtunding effect is probably not caused by any local anesthetic effect possessed by the gas itself.

Dr. KRATZER. I might have stated in the paper that usually I allow the patients to furnish pressure by giving them the bulb and requesting them to compress it. Then when the pain becomes greater than they can bear, they will instinctively cease the pressure, and necessarily the flow of air will stop. In that way it serves as a guide to the operator to know when the air is becoming too warm.

Dr. H. C. REGISTER. Some twelve years ago I read a paper and gave a demonstration at Cresson on this subject. At that time I was very much interested in the desiccation and dehydration of dentine. Feeling that I had gotten good results from removing the water from the fibrillar tracts and knowing that water was an essential factor in the transmission of pain, I thought if I could remove that which existed in the sensitive living matter of the tooth, that, so far as I did that, I would reduce sensation.

I made a great many experiments, spending a great deal of time and money, and I thought I had discovered the secret. While I made some progress, I did not succeed completely. One of the experiments that I made was to drive air, before housing it in the reservoir, through sulfate of lime and through chlorid of calcium; but I found these dehydrated the air to such an extent that it was extremely severe when used upon the dentine, so much so that I threw it aside.

I then, in connection with the air under pressure, used a coagulant, so that I could do away with too severe a shock in taking the water from the dentine; and in that way, in the majority of cases, I succeeded remarkably well.

I think that with the majority of patients temperament has a great deal to do with success in desiccation of the dentine. Where we can, by suggestion to the patient, get them to relax themselves perfectly, I find I get very much better results than where the individual is of that character that it is impossible for them to do it.

In regard to devitalized teeth, I think the desiccating process is a great help. The great trouble, I think, with these cases is not so much in ridding the pulp-chamber of its dead matter as it is in removing the dead matter in the dentinal structure. The condition of infected dentine, I think, gives fully as much trouble as septic conditions of the pulp-chamber.

Desiccation of the dentinal structure places it in a condition whereby we can introduce aseptic and unalterable materials into the structure and prevent further irritative action.

Dr. W. F. LITCH. In regard to the possibility of danger to the dentine and enamel from excessive dehydration, I have not personally observed any such results, and I think it hardly likely to happen in operations of moderate length,—of an hour or two. The fact that teeth which have been removed from the mouth and allowed to dry, become very brittle, is well known, but my observation is that that takes a long time. A tooth which has been extracted for a month will still retain considerable of its strength, is not apparently weakened very much, but after a longer time, three or four months, after it becomes thoroughly dry, there seems a splitting up of the enamel-prisms.

In regard to the desiccation of roots, I find plunging heated wires into the pulp-canals a very efficient way and entirely painless. It takes a little more time and is perhaps not as nice a way as by the electric cautery, but it does all the work that I think can be done under ordinary conditions. I think all that can be attained by the prolonged application to the root is superficial desiccation. You must remember that the root is highly porous in nature. What is required is, the removal of all animal matter from the pulp-chamber.

Dr. S. H. GUILFORD. The first point or fact I would like to state as far as dehydration is concerned, is that I consider it perfectly safe. I don't think it has ever done any harm to pulps or tissues. Many of the medicaments used for obtunding sensitive dentine are, I think, frequently dangerous to the pulp, and there is an element of danger associated with their use which does not make us feel entirely comfortable at times in using them.

The second point is as to its efficacy. I think there is no doubt in the world that the best obtundent we have is by turning on a current of warm air a sufficient length of time, whether associated with medicaments or not.

Another point touched on by the essayist and also by Dr. Kirk is in regard to the use of nitrous-oxid gas. I am quite satisfied that nitrous-oxid gas used in that way has no specific obtunding effect whatever. The gentleman who used it for that purpose used it simply because it was a gas in compressed form, just as we use compressed air as a matter of convenience. I have used it time and again as I have used compressed air, and I prefer the compressed air, because it is not so cold and does not require such an amount of heat before applying it to the teeth.

There is another use for compressed air that does not strictly belong to the subject, and that is for drying roots preparatory to setting crowns or bridges. My cylinder of compressed air is as necessary to me as my electric current or anything else I have in my office. By having a syringe, the bulb of which can be heated and the pressure regulated by a stop-cock, the young lady assistant holds that, and dries the roots thoroughly till they turn perfectly white, like chalk, while I prepare the crown for setting; by that treatment, when the crown is set I get much better results.

Dr. H. H. BURCHARD. One thought occurs to me—that desiccation, even if superficial, means change of shape. You can see, in drying out a tooth, that the pulp-canals will be very apt to change in shape, which manifests itself in the enlargement of the cavity. When a filling is introduced, when the rubber-dam is removed and absorption is re-established, there must necessarily be contraction; as the tooth absorbs moisture, there is contraction about the filling. So it suggests itself to me that possibly this may be one of the reasons why amalgam fillings bulge shortly after introduction; that it is the mechanical pressure of the tooth-walls resuming their natural shape and squeezing the amalgam, which is in a semiplastic state.

Again, there may be a very serious question whether it is a physical possibility to perfectly adapt cohesive gold to the walls of a tooth so that it shall be moisture-tight; the re-absorption of the moisture and contraction of the cavity-walls from the enlarged size would complete the fit of the filling. In many fillings that are microscopically imperfect when inserted, when the rubber-dam is removed and the tooth resumes its proper shape, there is a perfect fit; hence desiccation might have a definite advantage in this connection.

I merely offer the suggestion that desiccation means change of shape. You see it in ivory. As soon as ivory dries out, it changes its shape. The desiccation, even if superficial, means warpage to some extent.

Dr. EDWARD C. KIRK then read a paper, entitled, "Tooth-Bleaching Methods."

The essayist called attention to the increasing number of methods for bleaching discolored teeth which have resulted from the introduction of certain new therapeutic agents in dental practice, especially the dioxids of hydrogen and sodium.

The multiplicity of bleaching methods resulting from the use of these agents has led to some confusion as to the correct method of procedure in given cases.

The question is frequently asked, What is the best bleaching method? An analogous question would be, What is the best kind of medicine for a patient to take?

The successful treatment of a discolored tooth depends first upon a recognition of the conditions to be met. The bleaching process is one involving a chemical reaction between the bleaching agent and the material which causes the tooth-discoloration, whereby the latter is altered in composition or decomposed in such a manner that its characteristic feature, that of color, is lost.

The methods by which chlorin acts as a bleacher were explained in detail, and also the method of action of the dioxids. A comparison of the two classes of methods showed a balance of evidence in favor of the dioxids as bleachers for discolored teeth, with less tendency to recurrence of the stain after treatment.

The necessity for complete removal of the tubular contents of the dentine was shown to be a necessity in successful bleaching operations; the best means for accomplishing this object being the use of sodium-dioxid solutions or of Schreier's preparation in connection with pyrozone.

Particular stress was laid upon the necessity for avoiding the contact of metallic substances, instruments, or fillings, with the dentine in any case where chlorin or its compounds were used for bleaching. Neglect of this invariably results in a subsequent staining of the tooth from the metallic chlorids produced during the process of treatment.

Discussion.

Dr. R. Huey. For many years, from the beginning of my professional work, I have been interested in the subject of bleaching the teeth, and at one time I thought I had achieved a fair measure of success; but, with the old chlorin method, discoloration would necessarily return. I never yet had anything that approached a satisfactory solution of the difficulty until the pyrozone preparation came into the market. I have used the twenty-five per cent. solution with unfailing success in every case where the stain was the result of pathological condition of the tooth-structure.

It will rarely ever remove stains that have been caused by the conditions described by Dr. Kirk; but in normal conditions, resulting from disintegration of the teeth, the twenty-five per cent. solution will even with one sitting make a very great improvement, requiring no subsequent application.

Dr. H. C. Register. I think the principle involved, to which Dr. Kirk calls attention, is to get rid of the organic matter that causes the discoloration. I have successfully used a method which I will briefly describe.

I must confess that when I treated my first incisor by this method I had some anxiety as to the result; but my method was simply this: To use the desiccating process, as I usually do under such conditions, and apply a solution of sulfuric acid,—four to eight per cent.,—according to the density of the tooth; and the tooth being in a thoroughly desiccated condition, I then saturated it with tincture of iodin. A chemical change takes place, and a wonderful improvement immediately follows. The tooth is then treated to an application of ammonia water.

In reply to a question, Dr. Register said, after using the ammonia, he did not, as a rule, wash out the tooth with water. In cases of very extensive discoloration of the teeth, where the enamel-prisms have become affected by discoloration, after having followed the processes as stated he often used hydrogen peroxid or sodium peroxid to get a further bleaching influence.

Dr. Roberts. How long does it take you to restore the color of a tooth after you first start with your sulfuric acid?

Dr. Register. It is all done at one sitting, unless the tooth is very badly affected. The action that takes place is almost instantaneous.

At the closing session, July 11, an informal meeting was held. Dr. Boice described his method of setting the How crown, and stated that he had thus far had none to break or become detached.

Various methods of mounting crowns were discussed by the members present.

Dr. Jack gave a blackboard demonstration of his method of using matrices.

Dr. Register described a combination of gold and gutta-percha filling which he had used with success in the treatment of certain cases of frail teeth.

A general discussion as to the merits of gutta-percha as a filling-material ensued, after which the meeting adjourned until the second Tuesday in July, 1896.

The choice of meeting place was left to the decision of the Executive Committee as between Gettysburg and Bellefonte.

The Executive Committee have since selected Gettysburg as the place of next meeting.

C. V. Kratzer, *Secretary.*

UNION CONVENTION OF THE SIXTH, SEVENTH, AND EIGHTH DISTRICT DENTAL SOCIETIES OF THE STATE OF NEW YORK.

(Concluded from page 91.)

Second Day—*Afternoon Session* (Continued).

Dr. C. S. Butler, of Buffalo, gave an address upon "Narcosis and Forced Respiration." He said that nitrous oxid should never be administered unless the nose was left free for the admission of air, and this requirement is equally true for other anesthetics. The whole process of anesthesia is simply an assault upon the functions of vitality, and the operator can never know positively when the line of safety may be passed. In 1847 the action of anesthetics was described as first affecting the cerebrum, overcoming consciousness and intelligence, then the cerebrum and the spinal cord, so preventing involuntary movement, and last the medulla oblongata, stopping the action of the lungs and heart. The points here laid down have not been changed except that later physiologists hold that the sympathetic system plays a more important part in anesthesia than was first thought. Anstie, he thought it was, said the sympathetic system was the first to be affected by and the last to be overcome by the anesthetic used. Now with these general observations we are all prepared to realize that there is always a possibility of danger, and that we should always be prepared with every facility and remedy to overcome the dangerous symptoms when they appear. And we know that all remedies fail sometimes. Forced respiration as a resort in desperate cases has caused much discussion, and only within the last two years the celebrated Marshall Hall said that it should never be resorted to, but in the light of recent occurrences physicians are now beginning to realize its value and importance. His own personal experience has shown its value, and he would be glad to impress it upon all. He referred to the cases he reported to the Academy of Stomatology in Philadelphia (DENTAL COSMOS, January, 1895, page 66) of lives saved by means of forced respiration, and believed there were many cases where death might be averted by its use, and showed and explained the apparatus and the manner of working it.

Dr. G. W. MELOTTE, of Ithaca, illustrated with the aid of large models a method of taking impressions in difficult cases with undercuts. He also showed a method of preparing a molar tooth for a crown, removing the dentine and placing a snug-fitting tube crown so the lower part of the tube fitted closely about the tooth clear down to or a little below the free margins of the gum.

On motion, adjourned till Thursday, 9 A.M.

THIRD DAY—*Morning Session.*

The convention was called to order by President M. H. FISH, and in the absence of the author, Dr. H. D. WHITMARSH, of Binghamton, read a paper by Dr. A. C. MCALPIN, of Warren, Pa., the substance of which follows:

SOME PRACTICAL POINTS IN PORCELAIN WORK.

Porcelain work well done is very durable and artistic in appearance; done badly, it is more apparently discreditable to the operator than any other class of work in operative dentistry.

A conspicuous and radical fault found in porcelain operations is the carelessness with which colors are selected, the universal tendency being to choose too light and too yellow shades. The operator, disregarding the habits of his patient with regard to his teeth, selects porcelain facings and fillings to match the newly-polished or dry teeth, when oftentimes he well knows that the patient will allow the teeth to lapse into the old condition, and that the porcelain will not gather a like deposit with the natural teeth. A highly glazed porcelain facing on a crown should rarely be left. It may be remedied by deadening the surface with sand-paper disks, and polishing with buff and pumice. In porcelain fillings the color of the cement used as the retaining medium influences the shade, and care must be taken in its selection.

The operator in porcelain work should abandon small approximal fillings, and confine himself to labial fillings, conspicuous corners, and tips on teeth eroded or worn to cup shape. A porcelain filling involves the preparation of the cavity in such a way that the matrix can be easily withdrawn, without affecting its shape, and the completed filling can be inserted. Very acute marginal angles in the fillings should be avoided.

The use of separators enters largely in the successful insertion of approximal fillings, and simplifies an operation when many times it would seem impossible to insert the filling with a sufficient body to it for anchorage. To form a porcelain filling, take platinum plate of a gauge as thin as it is possible to use without tearing, anneal it to white heat, cool and place it over the cavity, forming a matrix by pressing it to the walls with cotton pellets, rolled hard, rubber points and burnishers, and getting the matrix well defined by burnishing it to the marginal lines and over the surface of the tooth around the cavity, the latter to stiffen the matrix and facilitate handling. Then fill the matrix with porcelain body to match the natural tooth, and fuse. Remove the platinum, make slight retaining-grooves in the body of the filling with diamond disk, these grooves to abut as nearly as possible upon similar ones made in the side walls of the cavity. A mere scratch in the labial cavities will suffice. Then dry the cavity and filling, and insert with a thin mixture of cement, cover with sandarac, and allow to set well before removing the surplus cement. Extreme care should be taken that the marginal lines should be so perfect that subsequent grinding on them will be unnecessary. In filling cervico-labial cavities, pink porcelain body can be used to take the place of gum-tissue lost through recession. In large corners and tips, oftentimes short double-headed pins should be made and used, one head in the filling, the other as anchorage button in the cavity.

The operations next described are those in which porcelain work is most valuable. In these the jacket crown is used. Teeth that have been repeatedly filled with metals and have as often failed can be restored to their natural appearance and use without disturbing the living pulp. When the natural crown has decayed beyond the metal filling, and the tooth is yet alive, or the crown is undeveloped, or is irregular in form, or twisted in its socket, or slightly out of position, or worn away by friction or erosion, it can be crowned and regulated without sacrificing the pulp, and with a crown whose facing has the firmest attachments throughout its entire palatal surface, thus making the strongest porcelain-faced crown known. These crowns are so constructed that easy access to the pulp in direct line with the root-canal can be had in case of subsequent trouble. They are commonly used only on the twenty anterior teeth, as gold crowns are usually practicable for the molars. The crown is made as follows: Reduce the natural crown to a size which will admit of a No. 28, American gauge, platinum plate over the entire palatal and approximal surfaces, and a twenty-two gauge porcelain facing. Obliterate the cervical ridge, then fit the cervical circumference of the stub with a thirty-gauge platinum cylindrical tube (in making which, lap the metal ends a little); solder this with pure gold, using as little as possible, place the tube on the stub, mark it on a line with the palatal surfaces of the approximating teeth and gums, and grind the tube inside the lines with a dry stone, to such thinness that it can be burnished to the stub without affecting the cervical adaptation. Then solder to this surface, with pure gold (using as little as possible), a twenty-eight American gauge platinum plate, *this* to form the entire palatal and about half the approximal surfaces of the crown. Then mark and grind the labial surface of the tube and adapt to the stub by pressure, without burnishing. Use for this an old serrated amalgam plugger, that the ground surface may remain rough for the adhesion of the porcelain, then grind the back of the veneer facing so that, when placed on the shell, it will be in the position required when finished. Remove the shell from the stub, heat it to white heat, to cleanse and prevent carbonation, which might discolor the facing, and place the facing in the shell in correct position, with the porcelain body between, and dry well before baking. Bake to a slight gloss only on the porcelain body, cool slowly, and finish the same as in Richmond crown-work.

In attaching a bridge tooth to a jacket crown, allow the heavy palatal backing to extend across the space to be filled, roughen its labial surface with a dry stone, curl the edges slightly to stiffen them, and proceed with a facing as in the jacket crown.

For longer bridges, the jacket minus the porcelain can be made, but with pins attached to the labial surface, the bridge teeth soldered to them as in ordinary bridge-work. The facings can be put on the shells by the method explained, in the attaching of a cup facing. For replacing a lost facing from a bridge which is broken, burnish a thirty-two-gauge platinum plate to the bridge backing, with holes to allow pins to go through the plate, solder to this with pure gold (using as little gold as possible) two tubes of platinum made to fit closely over the pins. Attach to this the old facing or a duplicate, in the same manner as in attaching the facing to the jacket crown. Cement this on, and you have a permanent repair without the trouble of taking off the bridge.

To those aggressives who, with impunity, knock out the pulp and never lose from subsequent trouble more than the old original two per cent., this jacket crowning will seem superfluous ; but to those meek and lowlys who advocate the preservation of the pulp whenever possible, and wish to be free from the two per cent. mortality, and at the same time wish to feel the satisfaction of doing better work, this method of crowning will commend itself.

Some other practical uses for porcelain work may be found in fusing pins or porcelain buttons on blocks, repairing cracked blocks, contouring teeth and portions of gum sections, making two blocks continuous, coloring teeth with mineral stains or bodies to match anomalous shades, painting gold fillings on artificial crowns, etc. In post crowns, perfect adaptation to the root with porcelain can be had by fastening the screw-post in the root first, and proceeding as in the attachments of a cup facing, making the entire crown, with the exception of the veneer facing, of the porcelain body.

Porcelain work enters largely as an aid in orthodontia, and a little experience in the jacket- and bridge-work will enable the operator to discern those cases in which it can be used.

Discussion.

Dr. W. M. SHARP, of Binghamton, regretted that the processes and methods treated of in the paper had not been more particularly described, as it is necessary to know the details exactly to do such work. When the paper speaks of porcelain fillings, it apparently means glass. He had had but little experience with glass for fillings, and no desire to use it. In making porcelain fillings it is better to make the filling too large for the cavity, and grind it to fit. In repairing crowns and bridges it is necessary to roughen or perforate the plate, or the porcelain will flake off. There are many uses porcelain can be put to in repairing. Porcelain sets or bridges can be repaired by putting enamel on the broken parts and baking them together ; it will be as strong as ever.

He did not like mineral stains for coloring, as they were not permanent. It is very important in all porcelain work to watch the heat carefully, as one can easily over fuse or under fuse the material and change the shade. He did not think jacket crowns made as the paper directs were practicable, as, unless they were very bulky, they would flake off. He said the paper does not speak of continuous-gum work, which he thought the most beautiful and artistic work done in prosthetic dentistry. He exhibited a set of this work of his own make.

Dr. G. W. MELOTTE spoke very highly of continuous-gum work, and especially of the specimen shown by Dr. Sharp.

Dr. F. A. GREENE thought porcelain work much more worthy of attention than the average dentist seemed to consider it. To many it seemed difficult; but with a little practice it becomes easy, and the result is very satisfactory. It should receive more general attention. A dentist with ordinary ability can soon master its difficulties.

Discussion closed, and Dr. SHARP exhibited an artificial palate which he had made for a lady who was present. The lady had worn it only three days; but it had already enabled her to speak with improved distinctness, which was very apparent when she removed the palate and tried to talk without it.

Dr. F. A. GREENE described a method of applying porcelain faces on molars and bicuspids in bridge-work without soldering.

Dr. J. W. HECKLER, of Buffalo, described a method of quickly making a crown, and also demonstrated filling with soft gold.

Dr. C. E. INGALLS, of Cortland, showed his method of taking impressions of the mouth, using beeswax.

Dr. J. H. BEEBEE, of Rochester, described the use of Darby's tin as filling-material inserted with instruments adapted to use with soft gold; also showed his manner of making gold cylinders.

On motion, the president appointed the Joint Business Committee for next year's meeting as follows: F. A. Greene, T. A. Barnes, W. E. Marshall, F. J. Woodworth, G. H. Smith, W. W. Coon; after which the convention adjourned, to meet next year in Rochester.

SOUTHERN DENTAL ASSOCIATION.

(Continued from page 65.)

FIRST DAY—*Afternoon Session* (Continued).

THE subject of operative dentistry being called by the chair for discussion, Dr. GORDON WHITE, Nashville, Tenn., read a paper upon "Capping Pulps," in which he detailed a method which for years had given most satisfactory results to himself and his patients. He said, in part: A number of years ago I began the use of chloro-percha in the filling of pulp-canals. A few years later some one suggested the addition of aristol to the chloroform before dissolving the gutta-percha. This proved so satisfactory, and seemed to produce so little irritation, even when it penetrated the apical foramen, that it was decided to make some experiments in its use for capping pulps.

About four years ago my attention was called to the fact that I was rarely having any annoyance whatever from capped pulps; and though I had been trying this material for some time, it was, I regret to say, without system. At this time the operation was conducted as a systematic procedure and with a watchful eye.

Before the operation is commenced, the patient rinses the mouth with as warm water as can be used comfortably, to which is added a little alcohol or a few drops of some of the antiseptics. The cavity is then washed with warm water from the syringe, and the excavation begun in the usual way. Occasionally, or as required, the cavity is wiped out with a small pledget of cotton saturated with chloroform. When it is prepared for the capping, with a small pair of scissors and foil-pliers, they having been sterilized with hot water, a small piece of paper from a prescription blank is cut to fit approximately the point to be capped, or the entire bottom of the cavity, if preferred. This paper cap is dipped into chloroform, which, of course, quickly evaporates, leaving it with its original stiffness and, for this purpose, sufficiently sterilized. On one side of the piece of paper, with a small pointed instrument, sterilized of course, place the smallest particle of the chloro-percha solution in which has been dissolved fifty grains of aristol to the ounce of chloroform. This forms nothing more nor less than a little plaster. The cavity having been previously wiped out with chloroform, which leaves it dry, this little plaster is turned on to the exposure and gently pressed into position with the smallest piece of spunk.

On this cap are now thrown a few draughts of hot air, which soon evaporates the chloroform from the paste, leaving the cap rather securely stuck to its position. Over this is placed a little thin cement, and, when hard, over this cement capping is inserted whatever filling is desired.

During these four years I have capped, by this operation, something more than a hundred pulps, and up to the present have been able to record only five failures. Two of the cases I had no hope of saving, for they had given trouble for three months or more ; but so successful had the operation generally been, I took the risk of making the experiment. Two others had also ached for a short while, but there seemed to be almost no inflammation. The last was that of a superior molar in which developed a pulp-stone, and which of course necessitated the removal of the pulp.

I am persuaded that in the field of dental operations the capping of the dental pulp is as successful, properly performed, as the average dental operation. In my practice I have tried every plan which came to my knowledge, as well as many original experiments ; but from no other process have I had such results. Capped pulps do live. Within the past few days I have seen a molar whose pulp I capped fourteen years ago, and it had every sensation of a normal tooth. In 1883 I performed the operation on a bicuspid, for our friend Dr. Noel. The tooth had caused him some uneasiness, and when the leathery disk of decalcified dentine was lifted from the bottom of the cavity, the pulp was found exposed and bleeding. The doctor is with us, and can testify to the present condition of the tooth.

Discussion.

Dr. H. J. McKellops had used for a good many years a method of capping pulps which he could recommend, whether the pulp is actually exposed or merely sensitive to heat and cold. He uses a cap cut from asbestos paper and covered with a paste of iodoform in glycerol. He was satisfied that any one who would try this method would get good results from it.

Dr. J. Y. CRAWFORD. Nowhere is the importance of differential diagnosis more emphasized than in capping exposed pulps. The pulp is a very sensitive organization, but I am convinced that when properly handled and under proper conditions the vitality of an exposed pulp can be conserved. I know of no agent more valuable in this connection than pure beech-wood creasote. In the use of the chlorid or phosphate of zinc cements it is essential to have only the finest, purest, cleanest white oxid of zinc from which every trace of arsenic has been removed, and this is very difficult to get. Dr. White, of Silver City, N. M., is enthusiastic as to the valuable qualities of what he calls *Balsamo del Deserto*, and presents an interesting record of the results of his experience in the use of this material.

While I stand committed to the idea that it is the proper conservative practice to endeavor to preserve the life of an exposed pulp, I again emphasize the importance of accurate diagnosis. We must have the precedent history of the tooth, a knowledge of the constitution and temperament of the patient ; we must consider the environments of the tooth, the condition of the tissues, the character of the dentine, the age of the patient. The younger the patient, the more important the preservation of the vitality of the pulp, that it may continue to perform its functions in the nutrition of the tooth.

Whenever you find the dentine non-sensitive, you may consider it a pathological signal, an evidence of paresis in that side of the pulp ; the dentine is partially devitalized. This condition is often found in the first permanent molars of young patients. If thin cement is flowed over this portion of the tooth, the pulp may reassert itself and the dentine be restored through renewed vitality. But if within from twelve to twenty-four hours we do not get a restoration of sensation, we know that sooner or later that tooth will give trouble.

Dr. J. H. BOOZER does not consider flowing an antiseptic plaster over the point of exposure a desirable procedure. He has been successful in capping pulps by using the balsams, with a cap of paper or tin foil.

Dr. JOHN S. THOMPSON, in capping pulps, cuts the cap from that portion of an envelope which is gummed, moistens it on the lip or tongue of the patient, and applies it to the exposed pulp, covering it with cement. The paste used by the U. S. Government is a pure antiseptic dextrin paste, and he has been very successful in saving exposed pulps since he has capped them in this way.

Dr. C. L. BOYD has been more successful in saving exposed pulps since he had adopted the plan of devitalizing the pulp of every tooth in which he does not find the dentine sensitive above the cornua of the pulp. The successful use of aristol demands considerable experience to know when its use is indicated, and it is also inconveniently sticky and gummy. A mixture of oil of cloves, carbolic acid, and beech-wood creasote makes a good covering for an exposed pulp, pressed to place under an inverted disk, all excess of fluid being removed with absorbent cotton, and soft oxyphosphate cement placed over the cap, carefully avoiding pressure on the pulp. By selecting only teeth in which the dentine is normally sensitive, he saves ninety out of a hundred.

Dr. L. M. COWARDIN. I do not claim to be successful in capping pulps. In 1873 I ventured to deny the possibility or probability of success in this operation. I consider it a physiological impossibility to save a really diseased pulp. This is the conclusion of the men who have made a special study of the anatomy and the histology of the pulp. This statement is based on the nature of the pulp-tissue and also on the construction of the apical foramen.

As it is very important to save the pulp of a first permanent molar when exposed before the root is fully formed, the attempt should be made. After cleaning out the cavity as much as possible, saturate the tooth with creasote, and fill with oxychlorid of zinc. This is the only feasible procedure. A pulp that has been interfered with will never resume its physiological functions again, although it may under some conditions remain alive for a while. Realizing this truth and governed accordingly, I rarely see a swollen face among my patients. To cap a pulp is the most delicate operation that can be undertaken, and requires to be so nicely performed that we are not justified in recommending a procedure which probably means the infliction of an insufferable amount of pain. When but a few months married I was very anxious to save an exposed pulp for my wife. For several months it seemed to be *one successful case.* But she complained of headaches, neuralgia, darting pains, etc., and five years later it was all located in this particular tooth. With a very small cavity,—the tooth a third molar,—the pulp was found sloughing on the surface, though almost normal at the apex.

Dr. T. M. ALLEN. It is very important to make the proper distinction in cases. If I expose a pulp myself, I try to save it; but if it comes to me having been long exposed, full of *débris*, aching, etc., I don't think I can save it. We must discriminate. Many cap pulps and think they have saved them, but I see some of that kind afterward, and the patient wishes they had not been *saved.* When there is a layer of leathery dentine that can be made aseptic and covered with an asbestos cap over which cement is flowed, we may be successful; but that is not capping an exposed pulp. It is applying antiseptic medication to the dentine.

At the evening session, Dr. M. H. CRYER gave a lantern exhibit of some studies of sections of the maxillary bones.

SECOND DAY, NOV. 6.

The morning of the second day was devoted exclusively to clinics.

The association was called to order at 2.30 P.M., and the subject of "Operative Dentistry" was again called.

Dr. W. T. ARRINGTON then read a paper upon "Soft Foil and Conservative Methods," describing in detail his method of filling certain typical cavities. The essential feature upon which the author laid stress was the method of securing adaptation to the cavity-walls by means of Abbey's soft gold foil, and the avoidance of deep anchorages in the shape of retaining-pits or undercuts. Where contour was in certain cases demanded, or when cohesive gold could be employed to advantage, the major portion of the filling, and especially that in contact with the cervical margin and frail walls having been guarded with soft foil, the remainder of the filling was to be completed with Watts's crystal gold, No. 2. In cases where gold seemed incompatible with tooth-structure or oral fluids, the author recommended for bicuspids and molars the combination of gold and tin foil, equal parts.

The treatment which the author employed for cavities with near exposure of the pulp was detailed at length, and followed well-known conservative lines in the application of plastics, either alone or in combination. The author called attention to the work in soft gold done by well-known practitioners of forty or fifty years ago, and expressed the belief that a larger percentage of their fillings are standing to-day than will be standing forty years hence of those made of cohesive gold.

Discussion.

Dr. E. P. Beadles. Dr. Arrington spoke of his methods as being perhaps considered *old fogy;* but I agree with him in almost every point. I differ a little with him in methods, and do not always agree with him as to materials. His ideas, however, are not "old fogy" if that means obsolete, or out of date.

Dr. G. F. S. Wright. I have listened to Dr. Arrington's paper with much pleasure; but whenever members of the dental profession bring up the methods of forty years ago, they take we younger members at a disadvantage. He fails to tell us how to restore the V-shaped spaces they made; how to knuckle up and restore the true shape of the teeth, as we do with cohesive gold. I would thank him to tell us how to do that with soft foil. An anchor-screw will retain such a filling made with cohesive gold as could never have been made with soft foil. The fillings of forty years ago were rammed in by hand-pressure sufficient to dislocate the jaw; in fact, it sometimes did. They are continually ringing the changes on the teeth that have "stood for forty years," filled with soft foil. I don't doubt but that it is so; but you can save a tooth for ten years with cohesive gold that you couldn't save at all with soft foil. I quite agree with all that he has said of plastics.

Dr. L. G. Noel, Nashville, Tenn. I admire the concise perspicacity of the paper, and I understand the value of plastics; but I consider it unprofitable to rake up the old fight of soft gold *versus* cohesive. Soft gold has its uses, and I do not entirely discard it, but use it in many cases now. But since the fight was first instituted there have been great improvements in cohesive gold. I am not sure that we get as good adaptation with cohesive gold as we can with soft gold.

Dr. T. M. Allen. Whenever we discuss operative dentistry, we get on to the comparative value of materials. It makes no difference what material we use if the material used is properly inserted. Dr. Arrington is right in what he says about the preparation of cavities. There is more in that than in the material we use. Anything that is so inserted as to be moisture-tight will preserve the tooth. Soft gold is properly non-cohesive gold, but it can be made cohesive by heat. I prefer to use soft gold when the cervical wall is gone, but I finish with cohesive gold. Cement mixed with amalgam makes a sterilized germicidal tooth-lining, preventing the effects of thermal changes.

Oxyphosphate cement over this lining makes a good non-conductive filling.

Dr. J. Y. CRAWFORD. I did not hear all of Dr. Arrington's paper, but was pleased with what I did hear. Many things can be done with so-called soft foil; the distinction drawn should be cohesive and non-cohesive foil. In my candid opinion, there should generally be such a handling of cohesive foil as will make it non-cohesive. Soft, or non-cohesive gold, particularly that furnished by Charles Abbey, is a better tooth-preservative than any other one form of gold ever made.

That time will demonstrate this, I am satisfied. Jenner's deductions from the milkmaid's immunity from smallpox were at first laughed at and received with incredulity. To-day our strongest hopes for relief in cerebral therapeutics, in the dreaded hydrophobia, lie along that very line. What was once laughed and scoffed at is now recognized as a great truth. So when I say that soft gold is an antiseptic germicidal agent, I subject myself from time to time to be laughed at. Dr. Miller's (Berlin) experiments with various filling-materials are well known. Of all the materials subjected to the test, only those containing copper and Abbey's gold foil (which had not been subjected to heat) showed a clean, clear space around it not infected with fungi.

For contour work, line the walls with Abbey's non-cohesive gold, and then knuckle up and do your beautiful work. We thus secure a condition of asepsis, a freedom from fungi, by the use of Abbey's soft gold.

Dr. PEABODY. I regret that I did not hear the paper, but the remarks of Dr. Crawford open up a new line of thought. If I understand him correctly, he says that Miller took the various materials we use for filling teeth,—for their preservation,—and by subjecting them to the methods of germ-culture found that all but copper and Abbey's soft foil were liable to infection, and that when Abbey's foil was subjected to heat, it became equally subject to fungi.

Why does not the red heat make Abbey's foil more pure and less subject to infection? What is the best germ-destroyer? Fire. What do we use for our infected instruments? Boiling water. But few germs can stand that ordeal. And yet Abbey's foil, which is free from any toxic qualities, when subjected to red heat becomes subject to the influence of germs? That is a paradox which I cannot understand.

Dr. CRAWFORD. It would seem, from Dr. Miller's experiments, that there is in Abbey's foil a something—a thing, an antiseptic influence—that is destroyed by heat. By the application of heat, this subtle *something* is driven off, so that its antiseptic influence is destroyed.

Dr. W. E. WALKER. In discussing the subject of operative dentistry, we are not committed to the subject of the paper. In the discussion of the paper on pulp-capping, last night, some points were touched upon that will bear further discussion.

When Dr. Crawford spoke of the zone of non-sensitiveness near the pulp, in a near exposure, I thought he was going to speak of two conditions which I have observed when the dentine is non-sensitive. I have observed this condition of non-sensitiveness, but never the restoration of sensitiveness after twelve or twenty-four hours of which he spoke.

But I have found one of two conditions usually prevailing in this non-sensitive zone. Either the non-sensitiveness results from infiltration of calcic matter, which condition is not so unfavorable, or the contents of the tubuli will be found putrescent. In the first-named condition, the dentine is hard and usually of nearly normal color; but in the second condition, the color may vary from normal to dark gray, and upon cutting into the dentine it will be found softer than normal; and upon cutting down through it, we are apt to find that portion of the pulp immediately adjacent to the non-sensitive dentine in a dead and often decomposing condition, forming what might be called a pocket of pus and gases. In this condition, *hot* applications give pain, causing expansion of the gases, producing pressure upon the still vital portion of the pulp. This illustrates the importance of differential diagnosis. Dr. Jack's subdivision of the conditions of the pulp into the subjective and the objective stages is a valuable aid in diagnosis and treatment. A knowledge of temperaments is important in its bearing upon pulp-capping. I find a person of the nervous temperament a much better subject for pulp-capping than the lymphatic. They have much greater vitality and power of recuperation. They can go very near to the point of death and come up again, while a person of lymphatic temperament, having lower vitality, would succumb. It is more difficult to devitalize a pulp for a person of nervous temperament, and hence our better success in pulp-capping. The habits of the patient and the general health must be considered. We must study the patient as a whole. If from sedentary occupation, careless habits, or general disregard of the laws of health,—if from these or other causes the functions of the alimentary canal are sluggish, the colon habitually clogged,—it is better not to cap pulps for that patient. We must select our cases. I have an illustration of this in the case of a man who called himself a dentist, and who "practiced" upon the public in my town for a while. He had an absolute specific for capping pulps,—capped them all indiscriminately, even capping portions of pulps; did not care whether they were inflamed or not; a suppurating pulp made no difference; his capping saved them all. I tried to reason with him, and urged him to discriminate, but he had absolute faith in his pulp-capping specific, which he even talked of patenting if he could devise any means of also keeping his secret (and which, by the way, as he subsequently told me, was iodoform, creasote, and oxyphosphate). In about a year I met him again and asked him if he was still as successful as ever in pulp-capping. "Oh, no!" he replied. "I never cap pulps now." Nothing in the world can save an exposed pulp. The inevitable result of capping pulps indiscriminately must, in a discouragingly large proportion of cases, be *failure*, and this he had learned to his sorrow.

Dr. Gordon White. As a young man, Dr. Patrick discouraged me so about capping pulps that I concluded he must be right; and having lost a good many capped pulps, for a while I destroyed almost every pulp, whether it came to me exposed or whether I exposed it myself. I believed it was the correct thing to do it invariably. But after getting teeth more exclusively under my own care, I concluded to risk capping some that were clearly not dying. I thought perhaps it might be wrong to destroy all, so I began capping pulps again. I tried every method I could hear of, but, except in rare instances, I invariably lost them. But I learned to select my cases, and now rarely try to cap a pulp that has ached. As I said in my paper, for some time I have only taken the risk in two cases, as an experiment. Twelve years ago, in 1883, I capped a pulp for Dr. Noel. It had not really ached, but had given him an uneasy sensation. When I examined the tooth, I found an exposure which bled slightly, but I capped it, and that pulp is still living, as Dr. Noel, who is here, will testify.

I did not think it necessary, in my brief paper, to go into the conditions which justify capping. It is conceded that we do not attempt to save a tooth that has ached. I have inquired of my professional brethren who might possibly have fallen heirs to those that gave trouble. I have made most diligent inquiry, but I cannot find that any have given trouble. It is mistaken practice to destroy a pulp that has been accidentally exposed. I quite agree with what Dr. Walker has said in regard to temperaments, and have noted for many years that we have less success with persons of phlegmatic temperament. All will agree upon that if they have given the subject any attention.

Dr. NOEL. It gives me great pleasure to corroborate what Dr. White has said of the tooth he capped for me.

I wish to make one statement before the subject is dismissed. If the exposure is very extensive, we may have the misfortune to have some pressure upon the pulp from the capping, in which case, sooner or later, it will become necessary to devitalize the pulp before the tooth can be made perfectly comfortable. I am still in favor of using oxychlorid of zinc and creasote, as suggested years ago. In the salvation of deciduous teeth I think I have found a place for copper amalgam. In small coronal or approximal cavities in children's teeth, when we do not need something that shall last very long, a good copper amalgam is the very best thing. Before it wastes away it will have subserved its purpose for that tooth often, if it lasts only two years. It is decidedly antiseptic, and in children's teeth, where the cavity is small and not near the pulp, I use it all the time.

Dr. R. C. YOUNG. But what becomes of the copper that is washed out? And what if it is carried into the alimentary canal?

Dr. NOEL. There need be no uneasiness on that score. It will not poison the child.

Dr. YOUNG. I am not so sure about that.

Dr. F. PEABODY. I can testify to the value of copper amalgam in children's teeth.

I have in mind a case in which I tried indefatigably to save the teeth. I tried tin and amalgam in the approximal cavities, but they would fail in one or two months, until the teeth were nearly gone. I tried the ordinary alloys, cement, gutta-percha, tin. Finally, in despair, I tried copper amalgam. That was six years ago, and there has been no further decay. It has accomplished what I had not been able to do with any other material, and I tried them all. As to the wasting of copper-alloy fillings, I can't say what becomes of it, but for the first permanent molars it has been in, I cannot perceive that it has had any effect in any way except the good effect of saving the teeth, and I think it will stay there as long as it is needed.

Dr. MARSHALL. I cannot say that I cap all pulps that have never ached, bled, etc. I am satisfied that Dr. White has the success he claims, but I draw the line at pulps that have been traumatically exposed, but without inflammation, pus, etc.

Dr. R. C. YOUNG. In my experience, nine out of ten capped pulps die, though I think I exercise all possible care. I have many little children under my care, and I want to do the right thing by them. But what can you do when they come to you with the first permanent molars just through the gum, and the parents demand the extraction of abscessed aching deciduous teeth? What can you do in such cases? The roots are probably partially absorbed, and you cannot clean and fill them; you would go right through into soft tissue, or you might strike the permanent tooth germ. I can manage little children all right, but I do not know how to manage such cases.

Dr. W. E. WALKER. My practice with devitalized deciduous teeth is to fill them by the method suggested by Dr. Cravens a number of years ago, though in their treatment and antiseptic medication prior to filling I differ from him. I clean out the cavity and root-canals cautiously and carefully, and as thoroughly as possible consistent with due consideration for the little patient. As these teeth have but a limited time to serve, they can of course bear less perfect preparation than in what we call permanent work. I then pump or churn in phosphate of lime, in the magma state, working into this soft mass the dry phosphate of lime, filling the cavity as usual If this root-filling goes through it does no harm, and if there is further absorption of the root (as sometimes occurs in replanted or implanted teeth) there will be no stiff filling projecting beyond, forming an obstacle in the path of the incoming tooth.

Dr. CRAWFORD. The conditions existing beyond the roots of deciduous teeth demand different treatment when the pulp is involved. In all cases when the baby tooth is devitalized before it is time for it to be shed, there is but one method of treatment. Establish drainage, and control conditions. If you can get the opening into the root-canals funnel-shaped, you can put in a little iodoform or beech-wood creasote made into a sterilizing paste with a suitable powder, or you may put a little chloro-percha into the mouth of the canals if they can be easily entered; the feat to be accomplished is to get the cavity dry, clean, and sterilized. Then fill the pulp-chamber with gutta-percha, or the best cement you can get. I prefer Justi's, though there are doubtless others as good. If the little patient is irritable, postpone until another sitting the important work of grinding off the tooth with engine disks until it is made non-antagonizing, entirely preventing occlusion. Have the child brought back to you, and watch the tooth. After perhaps only a few weeks you will find that the teeth have come together again. Use the disk as often as required to keep the devitalized tooth non-antagonized until you reach the bifurcation of the roots, and but little is left to be shed. If inflammation supervenes, remove the cement and replace with warm gutta-percha, which will restore comfort. In this way premature extraction of the baby teeth is avoided, the new tooth coming in only at the proper time. We supplement absorption by exfoliation. I hope this is a definite answer to the question asked by Dr. Young.

Dr. W. G. A. BONWILL: All this talk about different kinds of gold amounts to nothing. Abbey's old-fashioned non-cohesive gold foil can be packed into any cavity with perfect homogeneity. Contour work using only cohesive gold comes far short of *saving teeth* compared with Abbey's old-fashioned gold. Not that adhesive gold cannot be properly adapted to the walls of cavities, but that Abbey's gold can be used for all purposes. But if you are using a make of gold that you understand, and are successful with it, use it, and do not fly from one to another because it is new, or some one says it is *the best.*

Dr. S. C. G. WATKINS. I was much interested in Dr. White's paper on capping pulps, but I cannot agree with those who would cap all pulps under all circumstances. Not that I think Dr. White does this, but he did not differentiate sufficiently, and it might be inferred that he does cap all exposed pulps in teeth that have not ached, but there are exceptions even then. My method, when followed closely, must give success. When the cavity is properly cleaned, lay a pledget of cotton saturated with oil of cloves over the exposed pulp ; this will not coagulate nor make a scar as creasote does, but has the same antiseptic advantages. Removing the cotton, I then apply a layer of asbestos felt and flow over it thin oxyphosphate, being careful to avoid pressure. When this has hardened I fill as desired. I have had very gratifying success by this method. I cannot add anything to what has been said of Abbey's gold, but I shall get some as soon as I get home, and see what I can do with it. As a rule we do the best work with the gold we are accustomed to use and have learned how to handle. We try first one and then another, till we find one that is exactly what we want. We are then apt to get enthusiastic over it.

Dr. R. D. ADAIR. I keep a close record, and watch closely all capped pulps. In seventy-five positively known cases I have eleven failures. I do not think it justifiable to kill a living pulp ; it ought to be forbidden. Cap it ; if it dies, the tooth will be no worse than if you had killed it ; but it may live. I do not think it justifiable without first making the attempt to save it, and I think the practice ought to be condemned.

Dr. ARRINGTON. I did not expect to be understood as claiming to build out my contours with soft foil. I contour when necessary, but I secure adaptation to the cavity-walls with soft gold. As to retaining-pits, they were carried to excess by enthusiastic contour-workers. Many of those beautiful operations of Varney and others encroached so upon the pulp that inflammation was set up and the tooth destroyed by the very procedure designed to save it.

Many who make a specialty of cohesive gold work are so wedded to it that soft gold finds no place in their work. It takes a more expert man to do fine work with soft gold than with cohesive foil. Any one can build up a contour filling when he has ample retaining-pits, and the front wall cut away ; but I prefer to avoid such jewelry-store work. I never purposely break a front wall if it can be avoided ; and the cases are very rare when it is necessary. Teeth can be filled and saved with almost anything in some hands. A gentleman once called to see me, wanting a tooth filled. On examining his mouth, I found four fillings above and four below which were a puzzle to me. They were black, like amalgam, but were not as hard as amalgam. I asked him their history. He told me that fifty-seven years before he was on the road, on horseback, when he met a man driving two horses, one of which was a perfect match for the horse he was riding. The man wanted to make a trade, but did not have the money to pay the difference. He said that he was a traveling dentist and had his kit of tools with him, and would fill his hollow teeth for the difference in the trade. A bargain was concluded, the fillings and the horse on one side, and the rider's horse on the other. The dentist got down, opened up his kit on a stump, took out a bar of lead, screwed it into a hollow tooth, cut it off and smoothed it down, filling eight, one after the other, four above and four below. That was fifty-seven years before I saw them all in place, preserving the teeth.

(To be continued.)

AMERICAN DENTAL ASSOCIATION.

(Continued from vol. xxxviii, page 1061.)

THIRD DAY—*Morning Session* (Continued).

DR. M. L. RHEIN, New York, offered a resolution, which received no second, for the appointment of a committee to draw up a circular letter to Boards of Education concerning the supervision of the cleanliness of children's teeth.

Dr. L. C. BRYAN, Basel, Switzerland, returned thanks for his election as an honorary member of the association, and proceeded to describe a number of devices, the invention of which he said was due to his being so located that the improved appliances ready to the hand of the American dentist at home were not available to him at the time they were needed. Among these was a cervical clamp with the bow cut so that it can be bent in all directions and thus be fitted to the most irregular cavity ; it may be fastened with the screw in any position. A mouth-mirror, shell-shaped rim, which, in addition to reflecting light into the cavity, catches pieces of gold which drop during operations on the upper teeth. A sponge-holder with mirror which, in addition to keeping the corundum cold, sharp, and clean, and preventing grit getting into the mouth, catches any particles of gold which fall when polishing. Moistening pads can be used, but he prefers clippings of sponge, which are kept ready in a dish of water, and after use are burned to recover the gold.

Dr. Bryan also showed some improvements on the Bogue matrices, an ingenious rubber-dam holder, and a dental ledger or journal specially adapted to family practice. One idea in this book is that new pages are added as required, it being necessary to occasionally rebind the book for that purpose. One book thus serves for many years, containing a complete record of the practice for the entire period. Dr. Bryan had used the same book for thirteen years, in which time he had had it rebound three times, adding fresh leaves each time, and so managed as to bring all members of a family together. The book now contains the records of over thirteen hundred patients, with notes and drawings appended.

Dr. Bryan also gave some account of a new form of mat gold which had been discovered by Dr. E. de Trey, of Basel. While it certainly had created quite a furore among the dentists of Switzerland, it had been in use too short a time to judge fairly of its final value. The surface of a filling made with it is extremely hard, and for this reason it should not be malleted. After a month's use of it he had at a clinic filled a superior first bicuspid distal and crown contour in nine minutes, and he believed it was well condensed. The manipulation is entirely different from that of other golds, especially the foil preparations, and requires considerable experience before the best results are attained. In his hands, after a limited trial, it had shown evidences of great superiority over other preparations.

The speaker then read a paper by Dr. DE TREY, describing his new preparation, which he calls "Solila." Dr. de Trey said that his mat gold was the result of twenty years' research, and claimed that it was more malleable, easier to work, and adhered more readily to the cavity-walls than amalgam. He had used it from time to time for twenty years, and for the past three years to the exclusion of everything else. Its qualities are due to its purity and the fineness of its structure. It is adhesive without heating, can therefore be used soft to fill delicate teeth; but when slightly heated, it is easier to work. It is easily combined with tin foil, forming a dense mass, antiseptic and non-conductive; adheres by pressure to all the higher metals from which the oxid has been removed mechanically. Thoroughly condensed surfaces of this gold are harder than those of Nos. 120 and 240 foil, so that care should be taken not to use too much of it, and thus avoid loss of time in dressing down. It can be folded nearly as easily as foil, without fracture or loss, or made into pellets like amalgam. The condensation is done so quickly that operators do not understand it at first, and he advised beginners in its use to experiment out of the mouth. It is extremely sensitive to heat, changing to lighter or darker shades according to the temperature, and should never be heated beyond a dark red. It should be kept well closed up to avoid impurities.

The "Solila" gold requires special instruments for its manipulation, the ordinary stoppers piercing and tearing the gold and condensing it badly. The paper closed with detailed instructions for the manipulation of the gold.

Dr. NELSON T. SHIELDS, New York, read a paper entitled "Scientific Filling of Difficult Roots," in which he insisted that the apex of each canal must be reached and every particle of decomposition removed. Always open into a canal with a bur, because thus you will avoid blocking the mouth of the canal with pieces of tooth-structure. Save all the tooth-structure possible, but never allow the saving to prevent entrance into the canal. After opening the mouth of the canal with the bur, use a Donaldson cleanser, No. 4 or 5, with which and a little perseverance the apex may be reached. Then puncture a small piece of rubber-dam and adjust it upon the cleanser, to serve as an indicator to the length of the canal from opening to apex. Moving the cleanser up and down, enlarge and clean the canal, and treat with non-coagulating disinfectants. Then a larger cleanser may be used, with the indicator upon it. The writer always makes a plugger for each canal by nipping off the end of a Donaldson bristle and flattening on a stone. This plugger is made, by means of the indicator, to just reach the apex without going through. Then soft gold No. 4 (unfolded if for a small canal) is cut into very thin strips, and these again into pieces one-third or one-fourth the size of a pin's head. These pieces are readily carried to the apex, as shown by the indicator. After a few pieces of the gold are placed, he does not *think*, but *knows* the apex is filled. The remainder of the canal can be filled with whatever material the operator can most conveniently manipulate, and thus the root is placed in the best possible condition.

Dr. S. FREEMAN, New York, read a paper entitled "The Use of Compressed Air in Operative Dentistry." An abstract follows:

For condensing the air, Dr. Freeman expressed his preference for the Champion beer pump or the compound pump by the same manufacturers, the latter preferably when the water-pressure available is not more than twenty-five pounds, as it is frequently necessary to have a pressure of forty to fifty pounds to the square inch. The reservoir is a tank tested to one hundred and fifty pounds' pressure to the square inch; the gauge used should be ample to show the maximum amount of pressure in the office.

Dr. Freeman uses the compressed-air apparatus in spraying the mouth to produce an antiseptic condition, deriving excellent results from the following prescription:

℞—Borine, 1 part;
Pyrozone Med. 3 per cent., 2 parts;
Water, 1 part.

He also finds it of great assistance in cases where the patients are unable to breathe through the nostrils, and so cannot allow the use of the rubber-dam. A two per cent. solution of cocain thrown into the nostrils under ten to fifteen pounds' pressure enables you to proceed with your work in a few minutes without inconvenience to the patient. In stomatitis of various kinds, the spray employed with high pressure produces excellent results: In aphthous stomatitis he had obtained a cure in two days, using pyrozone med. three per cent. four ounces, and borine two ounces, in the atomizer under forty pounds' pressure, followed by a mouth-wash of pyrozone and soda mint. In a case of mercurial stomatitis, sprayed with pyrozone med. three per cent. at thirty to fifty pounds' pressure, followed by a mouth-wash of pyrozone med. three per cent. and borine equal parts, the gums were in a healthy condition in four days.

In applying any medicine to the gum it is always necessary to have a dry surface, so that the medicament shall be readily absorbed. By drawing back the corners of the mouth with a napkin or piece of cottonoid, and throwing the compressed air directly on the spot, it only takes a few seconds to procure the desired condition, and on applying the medicines you get immediate results, the air-pressure being again used to drive the medicines into the tissues. The application of counter-irritants, sedatives, and local anesthetics is made easy. The anesthesia from cocain is not so deep as follows injection, but neither had he observed any toxic symptoms following its use.

In the treatment of diseases of the antrum, the writer follows the method described by Dr. Frank Abbott before the New York Odontological Society, November 20, 1888, spraying under thirty to forty-five pounds' pressure. In pyorrhea alveolaris, fifty or sixty pounds' pressure throws a stream with such force as to entirely cleanse the parts; then the Davidson spray-tubes filled with pyrozone med. three per cent. throw so copious a spray that the gum is lifted away from the teeth, introducing the medicament directly to the seat of trouble, forcing away all foreign particles, and giving a clean, antiseptic condition. Dr. Freeman uses these spray-tubes and compressed air for introducing medicines, washing out cavities preparatory to implanting teeth, and in general for all wounds and diseases of the oral cavity.

Reciting briefly the minute anatomy of the teeth, Dr. Freeman showed how the compressed air could be utilized to desiccate the dentine and force medicaments into the canaliculi and tubuli for obtunding sensibility, so that the tooth can be excavated without pain and without subsequent irritation. With this method it is not necessary to employ acids in introducing the cocain, nor lose time waiting for its absorption. The bleaching of teeth can be accomplished in half the time by the application of high pressure.

Dr. Freeman described other uses and demonstrated the method of using compressed air, which he strongly recommended.

Adjourned to 7.30 o'clock P.M.

Evening Session.

The association was called to order by Vice-President Watkins at 7.50 P.M.

Dr. H. W. GILLETT, Newport, R. I., read a paper entitled "Cataphoresis for Obtunding Sensitive Dentine."* In introducing his paper Dr. Gillett said that he did not claim cataphoresis as a new discovery. What he had to tell was concerning cataphoresis in living dentine, and it aimed to be a plain statement of facts only.

The special order of the evening, lantern exhibits, was then taken up. The first of these was by Dr. FRANK ABBOTT, of New York, previous to which a brief report from Section IV, Histology and Microscopy, was read by its secretary *pro tem.*, Dr. I. P. WILSON, of Burlington, Ia.; and a paper by Dr. VIDA A. LATHAM, of Chicago, entitled "A Case of Diffused Non-Suppurative Lymphadenitis of Dental Origin," was read by title.

Dr. Wilson's report stated that the past year in histology and microscopy had been one largely of re-examination of work hitherto done,—a sifting of truth from error. It also commended Dr. Bödecker's work on "Dental Anatomy and Pathology," and announced the two papers to be presented by the Section: one by Dr. Abbott, the chairman of the Section, with lantern exhibit, was partly a physiological study of the growth of the teeth and jaws, partly a study of the effect of continued irritation upon the dentine and enamel; the other by Dr. V. A. Latham, of Chicago, detailing a case of "Diffused Non-suppurative Lymphadenitis of Dental Origin." The patient had applied to a physician concerning a painful swelling above and behind the right ear, and the physician, who diagnosed inflammation of the superficial lymphatic glands, after exhausting all the available explanations without result, referred the patient to Dr. Latham for an examination of the teeth, the patient protesting that the teeth could not be at fault. The right inferior second bicuspid had a posterior approximal filling of amalgam, gave a dull sound on percussion and a sense of uneasiness ; tooth slightly loosened, but patient thought it felt "big" ; slight thickening over buccal surface of root. On removing the filling, the odor of hydrogen sulfid was very pronounced, and considerable relief ensued. After opening the root under antiseptics, the opening was loosely dressed. In three days a swelling occurred over the buccal surface of the right lower bicuspids. This was deeply incised, only a drop or two of pus escaping, the wound cleansed with antiseptics, and packed with gauze to secure drainage ; the opening in the root was enlarged, cleansed, and packed loosely with antiseptic cotton. A solution of eucalyptol, three parts ; oil of cassia, two parts ; oil of eugenol, one part, was used to penetrate the dentinal tubules, and closed in with a temporary stopping, and renewed daily for several days. The soreness and swelling reduced, the tooth was then packed tightly with dermatol in eucalyptol (Sanders), and sandarac cotton, then Jacob's stopping, and left two weeks, when the root was cleansed, filled with eucalyptol-percha and cement, the intention being to fill permanently with gold later, if no further trouble ensued, which at the time the paper was written—some months afterward—seemed unlikely.

---

* This paper will be found at page 132, current issue of the DENTAL COSMOS.

The paper also contained a full table of the lymphatic glands and their drainage areas, and a description of the methods by which they become inflamed and enlarged.

Dr. Abbott then proceeded with his exhibit, in introducing which he called attention to the fact that at the time the Section was organized the subjects of histology and microscopy were very little understood among dentists, as no college in the country, so far as he knew, pretended to teach the use of the microscope, the minute structure of the teeth or of other tissues. Now no college is considered thoroughly equipped which does not have ample facilities for teaching these essential and interesting branches of study,—a change which, with other advances, received its stimulus from the American Dental Association. The first researches in this country to determine the etiology and progress of the carious process in human teeth were conducted by himself in 1878. He hoped to see the younger men taking hold of these subjects more in the future than in the past.

Dr. Abbott then showed upon the screen a series of sixteen lantern slides illustrating the development of the teeth, both temporary and permanent, at various stages from birth to their final loss, and the atrophy of the alveolus and maxillary bones as observed in old age. The periods shown were : At birth, showing the crowns of the temporary teeth nearly or quite formed ; fifth to ninth month, eruption of the temporary central incisors ; eighth to tenth month, eruption of the temporary lateral incisors ; twelfth to fifteenth month, eruption of the temporary first molars ; seventeenth month, temporary cuspids erupted ; about two years, temporary second molars erupted, completing the deciduous dentition ; six years, permanent first molar erupted ; eight years, temporary incisors replaced by the permanent ; ten or eleven years, lower temporary cuspids still in the mouth, while in the upper jaw their places are occupied by the permanent cuspids and the first bicuspid ; twelve years, the temporary teeth replaced by their permanent successors except that the second bicuspids are not yet in position ; the second permanent molar is also erupted ; the next slide showed the entire permanent set, except the third molar, in position ; the next showed a full and perfect set of the temporary and permanent teeth of the upper jaw, careful measurements proving that the ten permanent teeth which occupy the places of the temporary ones require no more room than their predecessors. The two following slides showed respectively the temporary and permanent sets entire, the size of each tooth and its relations to the others being clearly seen. The fifteenth slide showed atrophy of both jaws after loss of the teeth, and the series closed with a comparative view of the jaws at three stages,—the child of two years, the man in full vigor and development, and the aged, after the loss of the teeth and atrophy of the alveolus and maxillary bones.

A second series of twelve slides, in cross and longitudinal section, showed the effects of progressive degrees of irritation upon the dentine and enamel of the teeth, as shown under high powers of the microscope.

Dr. M. H. CRYER, Philadelphia, read a paper entitled "Studies of the Maxillary Bones."*

Dr. W. C. BARRETT, Buffalo, had examined the specimens of which the photographs had been shown by Dr. Cryer, and they were a revelation to him and had materially modified his views of anatomy. Many points are presented more clearly in the specimens themselves than on the screen. Probably every practitioner of large experience has had cases in disease of the antrum for which he could find no clear reason. In a case of this sort not long since he had operated, opening into the sinus three times, finally through the external alveolar process, until he could explore it with his finger, when he found nothing to account for the amount of discharge and disturbance in the parts. Since seeing these specimens of Dr. Cryer's, he is satisfied that there may have been a continuous discharge from the frontal sinus down through the infundibulum and the ethmoid into the maxillary sinus instead of the nasal.

With reference to the frequent neuralgias in connection with the inferior maxillary, Dr. Cryer has shown that not uncommonly the root of a tooth, more especially if impacted, may penetrate into the track of the inferior dental nerve, thereby causing a continual irritation ; a condition which explains cases otherwise unexplainable. With reference to the formation which Dr. Cryer calls a cribriform tube, the speaker would have to think that over and make a more exhaustive examination before deciding to accept it, as also concerning the tubes passing to the roots of the teeth. It would have to be shown by the injection of the inferior maxillary canal.

Many of the specimens are of great interest, and they show as absolute demonstrations many points heretofore unknown or doubtful. They demonstrate incontestably some of the aberrations from ordinary normal structures in bone, and account for many of the pathological cases which would otherwise be incomprehensible.

---

* This paper was printed in the DENTAL COSMOS for January, 1896, page 1 *et seq.*

Dr. JOHN S. MARSHALL, Chicago, wished to express his appreciation of the papers of this evening, and more especially to thank Dr. Cryer for his work. He has brought out so many new and startling points that there would not be time to speak of all, and to refer to only one would be sufficient, the location of the entrance to the antrum. The latest teaching of the German surgeons advocates the treatment of antral troubles through the natural opening, the nose. Dr. Cryer's demonstrations explain why the speaker has many times failed to pass a probe after the method advocated by most of the German surgeons nowadays. It was because he was trying to pass it into the middle meatus about an inch and a quarter or an inch and a half from the nostril, sometimes trying to find the opening for an hour. He should make fewer attempts hereafter to treat antral disease through the natural opening, if it is true that the majority of antra have the opening as shown to-night.

Dr. J. D. PATTERSON, Kansas City. The continued pain which we often find resulting from the extraction of an impacted or partially erupted third molar, sometimes for weeks or months, finds ready explanation after this exposition. The force sometimes necessary for their removal presses the roots upon the nerve territory, and consequently the nerves are bruised and left in such condition that pain results, which is very hard to control, nothing seeming to afford relief. The difficulty in the diagnosis of these pains is now made simple.

Dr. A. H. THOMPSON, Topeka, Kansas, thought that this study could also be made interesting in following up the development of the head from early stages from the first formation of the skull. That would illustrate the development of some cavities and perhaps also the origin of this new sinus to which Dr. Cryer has called attention, which almost partakes of the nature of a new discovery. He wished to express his personal thanks and congratulations to Dr. Cryer for his work.

Dr. TRUMAN W. BROPHY, Chicago, thought it quite likely that Section VII would not have the opportunity to present anything more than has been given to-night during the present session, but as chairman of the Section he felt proud of the work which has been done. There is so much to think of in the specimens presented by Drs. Cryer and Abbott, so much to do with the treatment of oral diseases, that it will be impossible to mention more than a few points. He could not agree with Dr. Cryer in the proposed change of name for the inferior dental canal, because it has been so long known that it seems better to retain the old name. He had interrupted Dr. Cryer during his remarks to call attention to the fact that we might have excementosis on the ends of the roots of teeth in the lower jaw, thus producing pressure on the inferior dental nerve where they impinge on the canal, and we thus can account for many cases of neuralgia which have been difficult of diagnosis. We may also have the same thing in the young in cases where the teeth are erupting, and this physiological process may be converted into a purely pathological condition, when absorption of the overlying tissues does not go on equally with the development of the root and pressure is thus brought to bear on the inferior dental nerve.

The relation of the frontal sinus to the antrum has never before been so conclusively shown as in these investigations of Dr. Cryer's, and he has the thanks of the speaker and of his colleagues for his work in this direction. He would be very glad to know that duplicates of the specimens or of the slides shown to-night might be had, that the knowledge which they impart may be spread among the students of the colleges, as it would greatly facilitate the work of teaching the anatomy of these parts. He thought also that these illustrations show the value of the careful study of anatomy in our dental colleges.

Dr. T. C. STELLWAGEN, Philadelphia, had long desired a series of sections such as have been shown by Dr. Cryer, having felt that some such condition as has been described must exist; that the antrum was not a simple, but a compound cavity. Many years ago, in attempting to treat antral cases, he had found it almost impossible to wash the antrum out completely with a single opening unless it was very large, and he had taught his classes that they could succeed in half the time by having two openings into the sinus, one from the vestibule of the mouth, for washing, or from the side, and the other in the roof of the mouth. In many cases where a tooth has been the initial cause of the trouble, no bone need be removed from the palatal process. In the majority of such cases the osseous structure has been removed, so that mere penetration with the lancet, an operation so trifling as hardly to be worth dwelling upon here, is sufficient to gain entrance to the antrum. Yet there appears to be a wonderful diffidence about opening through this thin plate of bone. With the bur and engine it is far easier to cut through than an ordinary visiting card. The moment two openings are made, the syringing of the cavity is made as simple as can be. In a case treated by the speaker a few weeks ago, where death of a right lateral incisor had been followed by the formation of a cystic cavity, there had been a burrowing destruction until the cavity was one with the antrum. With the lancet he opened through the floor of the antrum with a decided cut of perhaps a quarter to a half inch, and washed out with iodin. Some years ago a prominent surgeon had told him that if he used iodin in the antrum he would kill the patient. That had satisfied him that it was good practice. Within an hour this cavity was well washed out and injected with tincture of iodin. The patient quickly recovered.

Dr. MARSHALL. What strength iodin solution do you use?

Dr. STELLWAGEN. Sometimes a saturated solution, sometimes a few drops to the ounce of water. It makes but little difference; the stronger the solution, the less of it should be used. A very strong solution should be put in a drop here and a drop there, allowing it to become diluted with the fluids in the cavity. If to be used to rinse out the cavity, the iodin should be dropped into water until the fluid is decidedly colored. In a case a few weeks ago, after washing out the cavity, he sent the patient to the seashore for the tonic effect, and was surprised at her return three days later, healed, except a small opening alongside the root of the tooth. Such an opening is a very excellent safeguard. The operation in these cases is very simple, but it has been so surrounded with precautions and expressed dread that our young men seem afraid of it.

Dr. EDWARD C. KIRK, Philadelphia, had been much interested in the discussion and in the exhibit made by Dr. Cryer, especially in one phase of it. We have heard it stated here that this demonstration was a remarkable thing, that it was a revelation, that it was wonderful. The speaker did not see anything wonderful or remarkable about it. It rather seemed to him the most natural thing in the world. There is nothing more wonderful about the facts which Dr. Cryer has shown than will be found in the investigation of any other natural phenomena. The wonderful part about the presentment just made is our own ignorance about it. From this exhibit it is quite apparent that much of our teaching concerning the anatomy of these parts has been erroneous. We have accepted the results of the investigations of ancient anatomists with reverence, perhaps because of their hoary antiquity ; but it seems that we have been largely wrong about it, and here is a man who has the brains and the clear insight into things to go right to nature for his facts. Why have we not been doing that before? Dr. Brophy has said that it would be of great value if there could be duplicates of these pictures for use in the colleges on account of their great educational importance, which shows that he appreciates the work, as does also the speaker. This demonstration is an evidence of the value of going to nature for our facts. This is the great underlying principle of the whole system of technics now being introduced into the schools, a system by which so much has been accomplished and from which so much more is expected. This is simply another application of the same idea, and it is that which gives value to what Dr. Cryer has so beautifully demonstrated here this evening.

Dr. JAMES MCMANUS, Hartford, Conn., had been much interested in and pleased by this demonstration, because it carried out the idea which he had had for a long time, and which had been forced upon him at the hearing before the legislature when a physician said that any physician could teach dentists anatomy and physiology. The trouble in the past has been that that is just the way in which we have been taught anatomy and physiology, from the standpoint of the physician. Here we have the evidence of what a practical, educated dentist can do who sets himself about the study of a practical point in dental anatomy ; and we are pleased because we have had a practical, earnest, scientific dentist show us these things.

Dr. M. H. CRYER, Philadelphia, was much pleased with the remarks which had been made regarding his endeavor to illustrate that which he had been working out. As to duplicates of the slides, he was under obligations to Messrs. Lea Brothers & Co. in that matter. Some time since Professor Litch had asked him to write a chapter on anatomy for a new volume of the "American System of Dentistry," to be published by the firm named, and he had agreed to do so provided they would use new cuts made directly from the subjects. This they promised to do ; and these slides have been made from photographs, from which also half-tone illustrations will be made, partly for the work mentioned and partly for another to be shortly brought out by the same firm under the editorship of Dr. Kirk. It is quite probable that they would want the book to come out before they would be willing to have the slides used. As soon, however, as he returned home, and had a little rest, he should begin the study of photography in order that he might photograph wet specimens as they came to him. Sometimes now a specimen gets broken before it is carried to the photographer. Then, too, the photographer does not know exactly what point is to be brought out. From the photographs which he hoped to make slides can be produced, which he would be only too happy to supply to any professor who wishes them for educational purposes.

Adjourned to 9.30 o'clock Friday morning.

(To be continued.)

DENTAL ALUMNI ASSOCIATION OF LOS ANGELES.

THE Los Angeles Association of Dental Alumni, which was organized February 10, 1895, is probably the only organization of its character in the United States. It differs from similar organizations in this particular point: that its members must be graduates of reputable dental colleges. Owing to this stringent rule the association has a membership to-day of twenty-four, who are practicing in Los Angeles and Pasadena, Cal.

The association holds its meetings on the first Tuesday evenings of each month, when papers of interest to the dental profession are read and discussed.

The annual meeting was held on January 7, 1896, when the following officers were elected: Dr. E. G. Howard, president; Dr. W. C. Smith, vice-president; Dr. W. A. Smith, treasurer; Dr. L. E. Ford, secretary; Drs. J. D. Moody, F. H. Sawhill, B. W. Day, board of directors.

L. E. FORD, *Secretary*,
118½ South Spring street, Los Angeles, Cal.

WOMAN'S DENTAL ASSOCIATION OF THE UNITED STATES.

THE Woman's Dental Association met January 4, 1896, at Dr. Anna T. Focht's office, Broad street and Columbia avenue, Philadelphia; the president in the chair.

The essayist for the evening, Dr. Ellen MacMurray, was not able to be present, so the time was given to incidents of office practice.

A demonstration of porcelain work was given by Dr. Focht.

Essayist on the list for February 1, Dr. Henry I. Dorr. Place of meeting to be announced.

EMILY W. WYETH, *Rec. Sec.*,
3920 Fairmount ave., Philadelphia.

ST. LOUIS DENTAL SOCIETY.

THE following are officers elect for 1896 in the St. Louis Dental Society: F. F. Fletcher, president; J. S. Coyle, vice-president; J. G. Harper, corresponding secretary; A. J. Prosser, treasurer; P. H. Eisloeffel, recording secretary; W. M. Bartlett, P. H. Morrison, T. L. Pepperling, committee on ethics; DeCourcey Lindsley, Wm. Conrad, J. P. Harper, committee on publication.

F. F. FLETCHER, *Cor. Sec.*,
701 Channing ave., St. Louis, Mo.

WASHINGTON CITY DENTAL SOCIETY.

AT their annual meeting, held at the Cochran Hotel, December 19, 1895, the Washington City Dental Society elected the following officers for the ensuing year: W. M. Hunt, president; D. E. Wiber, vice-president; W. N. Cogan, secretary; M. F. Finley, treasurer; H. B. Noble, librarian; G. L. Hills, essayist.

W. N. COGAN, *Secretary*,
1754 M street, N. W., Washington, D. C.

SAN FRANCISCO DENTAL ASSOCIATION.

THE officers elected for the ensuing year are as follows: Dr. Frank C. Pague, president; Dr. W. B. Sherman, vice-president; Dr. G. N. Van Orden, recording secretary; Dr. W. A. Knowles, treasurer; Dr. Mayo A. Greenlaw, corresponding secretary; Dr. L. Van Orden, Librarian.

MAYO A. GREENLAW, D.D.S., *Cor. Sec.*,
819 Market street, San Francisco, Cal.

QUINCY DENTAL CLUB.

THE leading dentists of Quincy, Ill., have organized a society. At a meeting held January 23, 1896, a constitution and by-laws were adopted, and the following officers were elected: Dr. R. A. Gardiner, president; Dr. Geo. W. Thompson, vice-president; Dr. Henry L. Whipple, secretary; Dr. Harry W. Wellman, treasurer. The executive committee is composed of Drs. Gilmer, Baker, Brown, Irwin, and Hug. The meetings are to be held on the third Monday of each month.

Dentists in the towns around Quincy are cordially invited to join and contribute in a literary way.

DENTAL SOCIETY ANNOUNCEMENTS.

INTERSTATE DENTAL MEETING.

THE state associations of Nebraska, Iowa, Kansas, and Missouri have arranged to hold a great joint meeting at Excelsior Springs, Mo., June 23–26, 1896.

Most of the states have abandoned their regular annual meeting, and preparations are now about completed which assure every dentist who attends a rare treat.

The program embraces five papers and six clinics from each state, besides a number to be furnished by distinguished men from other states. No dentist in these states can afford to miss this meeting.

S. C. A. RUBEY, *Secretary*,
106 E. Franklin street, Clinton, Mo.

VERMONT STATE DENTAL EXAMINING BOARD.

THE next annual meeting of the Vermont State Dental Examining Board will be held at the Weldon House, St. Alban's, Vermont, Tuesday, March 17, 1896, at 2 P.M.

A. J. PARKER, *Secretary*, Bellows Falls, Vt.

EASTERN ILLINOIS DENTAL SOCIETY.

THE eleventh annual meeting of the Eastern Illinois Dental Society will be held in Decatur, Ill., the third Tuesday in March, 1896, for a four-days' session. All members are requested to be present.

FRANK M. CONKEY, *Secretary*,
Homer, Ill.

EDITORIAL.

THE LITERARY PHASE OF DENTISTRY.

THE volume of literary matter representing the aggregate annual output in the field of dentistry is sufficient to convince any one that there is no present lack of writers or of subjects upon which to write. When, however, the product is critically examined, and that which possesses real value is sifted from what is of doubtful merit, the need for improvement in the general average character of our literature becomes evident.

The improvement needed relates to at least two qualities in our literature: first, the nature of the matter which forms the subject; and second, the method of its presentation as literature,—its literary dress, so to speak. More care as to these two features would eliminate from our literature in all of its departments much that is worse than useless, so far as any substantial benefit to dentistry is concerned, and would increase the value of that which really possesses intrinsic merit, by rendering it more attractive and more easily assimilated by the profession.

There is no lack of strong reasons why the literary tendency among practitioners of dentistry should be persistently cultivated. The benefits resulting from such a course affect both the profession as a profession and its members as individuals.

The cultivation of the literary tendency by the dentist, at least so far as it pertains to his profession, is one of the surest roads to success. This, we believe, is a fact which can scarcely be doubted.

By the literary tendency of the dentist in this connection is meant the ability to clearly and accurately describe whatever ideas he may possess that will add to the total of dental knowledge. This also necessarily implies the willingness to do so.

It may be well to define what is here meant by success. While we would not discredit the legitimate effort to achieve success in the acquisition of wealth or things having material value, it was long ago shown and is everywhere and constantly seen that these things of themselves do not bring a full compensation in happiness for the labor expended in their attainment.

Real success—that which endures to the end, and makes life a thing of beauty—is the resultant of certain motives and tendencies that have their foundations deeply laid in the individual character. First and most important of these essentials is the desire and ability to aid our fellows in developing to a higher plane of living, to impart to others something of what we ourselves may possess, that they may be benefited thereby. Life furnishes unlimited possibilities for the practical application of this principle. Its relation to the literary tendency in dentistry is perfectly plain, and when conscientiously applied does bring its full measure of the kind of success to which we have alluded. It does more than this. Neither professions nor corporations are as soulless as the disgruntled ones and malcontents would have us believe. The material success which is due to a man in compensation for labor well performed is as certain to come to him in just measure as a result of the appreciation of his colleagues, as is the success which he achieves within himself through the consciousness of having done well.

As to the effect of an improvement in our literary product, so far as the profession of dentistry is concerned, there can be no doubt. A tree is judged by its fruits. The thought of the profession is crystallized in its literature, and our status, as compared with other departments of life, is measured by the standard of our relative intellectuality. When we improve that, we in the same degree elevate dentistry.

It is frequently said that the ability to write is not given to every man ; but it may be asked, Is it ever given to any man? Is not literary ability an acquirement and a result of study and training as much, for example, as is the ability to perform certain operations in dentistry?

There are, no doubt, so-called geniuses, and there have been men who seemed to have a special genius for writing, but the real geniuses whose works have done the most to uplift and better humanity are those who according to Carlyle had a genius for hard work. Geniuses of this character can therefore be made, and, so far as literary ability is concerned, a fair degree of success is possible even to the ordinary average man if he is willing to make the effort to attain it. Many of our most careful observers and skilled practitioners are timid about publishing their ideas, largely from lack of familiarity with literary methods. Under the mistaken impression that they lack the gift of literary expression, they not only deprive the profession of much that would benefit it and, indirectly, humanity also, but they fail to receive that general recognition from their colleagues to which their real worth justly entitles them ; they achieve but a fraction of the reputation which would otherwise certainly come to them.

The literary tendency in dentistry is, therefore, something which should be cultivated and promoted, not only for the benefit of the profession as a class, but for its value to the individual writer, who is the first to receive its benefits.

An additional reason for the individual cultivation of the literary tendency is its educational value to the writer.

A conscientious writer is in the very nature of the case compelled to be a close observer and student ; the conditions of his work train him to habits of accuracy in these particulars. None but the hopelessly ignorant or those without a fair degree of respect for the truth have the temerity to submit to the court of public criticism a literary effort not based on experience correctly reported.

Such a course has uniformly proven suicidal to the reputation of the author when persisted in. There is no means of self-education for the dental practitioner more thorough in its effectiveness than the training which leads to successful literary work within his professional lines. There is good reason to believe that the literary tendency in dentistry is constantly developing ; the character and volume of the work being done shows an all-around improvement on that done in previous years.

A noticeable and commendable expression of the growth of this tendency is the appearance of several dental periodicals published under the editorial management of undergraduate students in several dental educational institutions in this and other countries. Some of these possess a degree of excellence equal to some, and superior to many, of the dental periodicals published under the editorship of full-fledged practitioners. In this connection we take pleasure in calling attention to the *Dental Journal*, published by the students of Michigan University Dental Department, as a creditable and commendable effort in dental journalism.

The training of the dental student in a literary way cannot fail to be of the utmost value to him in his professional career. It is a feature of such importance that the colleges of dentistry would make no mistake in fostering and promoting enterprises of that character wherever possible. Student dental societies are a generally recognized feature of college life, and for equally good, or even better, reasons the college journal should take its place as one of the important auxiliaries of our dental educational method.

A training in dental literary work which has had its inception along with elementary training in dentistry, and where the two are developed *pari passu*, would, if generally adopted, soon lay the foundation for a thoroughness and accuracy in the future literature of our profession which has been sadly lacking heretofore.

OBITUARY RESOLUTIONS.

We regret that lack of space compels us to omit the publication of obituary resolutions recently passed by the following dental associations upon several eminent practitioners, notices of whom have appeared in late issues of the Dental Cosmos, viz: Upon Professor James E. Garretson, by the San Francisco Dental Association, also by a memorial meeting of dentists held in Pittsburg November 7, 1895, also by the senior class of the Chicago College of Dental Surgery; upon Professor Thomas H. Chandler, by the Harvard Odontological Society; and upon Dr. W. H. Gingrich, of Norfolk, Va., by the Virginia State Dental Association.

CORRECTION.

In the proceedings of the American Dental Association published in the December number of the Dental Cosmos, page 1055, Dr. Corydon Palmer's reference was to Dr. William H. Atkinson, not to Chapin A. Harris, as printed.

The cuts illustrating Dr. M. H. Cryer's paper in our January number were prepared for the forthcoming fourth volume of the "American System of Dentistry," not the "American Text-Book of Operative Dentistry," as inadvertently stated on page 95.

BIBLIOGRAPHICAL.

Dental Pathology and Therapeutics, in the form of Questions and Answers. Compiled by Otto E. Inglis, D.D.S. Carefully revised by J. Foster Flagg, D.D.S., Professor of Dental Pathology and Therapeutics in Philadelphia Dental College. Third Edition. Cloth, 8vo, pp. 105, interleaved. Price, $2.00.

In one hundred and five pages the compiler has arranged a categorical series of questions, their answers and notes, relative to dental pathology and therapeutics as expounded by Dr. Flagg. The clinical descriptions furnished agree well with the general experience of special practitioners, but it is to be deplored that the teachings have not been based, as all other works upon pathology, upon a recognition of the existence and importance of pathological anatomy and its association with semeiology. No teachings in pathology and therapeutics would be accepted by the advanced teacher of the time which are not based upon the modern demonstration in pathogenesis. As a quiz book *per se*, upon the postulate of personal teaching, however, it is excellent.

DENTAL MATERIA MEDICA AND THERAPEUTICS. By JAMES STOCKEN, L.D.S. Eng. Fourth Edition. Revised by LESLIE M. STOCKEN, L.R.C.P., and J. O. BUTCHER, L.D.S. Eng. Pp. 155. J. H. Vait & Co., New York, 1896.

The fourth edition of this small work is a fair presentation of many of the data of materia medica adapted to the special field of the stomatologist. The teachings are safe and decidedly conservative.

Sodium peroxid and tropacocain, two agents of interest and value to the oral therapist, are not mentioned. The fact that cupri sulfas is a powerful antiseptic is omitted. In the list of remedies for stomatitis, hydrogen peroxid is not given the position it deserves.

OBITUARY.

DR. E. C. WADSWORTH.

DIED, in Brooklyn, N. Y., December 22, 1895, of cerebral hemorrhage and heart-failure, Dr. E. CLIFFORD WADSWORTH, in the fifty-seventh year of his age.

Dr. Wadsworth was born at Homer, N. Y., in 1838. He studied dentistry, and early in life settled in Brooklyn. He was for several years president of the Brooklyn Dental Society and trustee of the New England Congregational Church, and always active in movements inaugurated for the material improvement of the eastern district.

He was the oldest son of the late Rev. E. L. Wadsworth. His early education was acquired in different schools and academies, his study of medicine beginning when he was eighteen years old, with Dr. L. Stone, of Auburn, N. Y. After being with him for a year he chose dentistry for his profession, and became associated with Dr. L. Matison, of Auburn. In 1861, at the beginning of the war, he was with Dr. Stephen Bailey, of Washington, D. C., and shortly afterward accepted a position with Quartermaster-General Meigs. In his three years as chief clerk of one of the divisions he won deserved approval. Upon his resignation he received a handsome testimonial of his fidelity and courtesy. In 1864 he married Mrs. Sarah E. Wells, a descendant of the Hubbard family of Connecticut. Two years afterward he retired to his native place in central New York to recover his health, which had become greatly impaired by his work in Washington. In a short time, however, he was the possessor of a large and lucrative business in Brooklyn which steadily increased. He received the degree of Doctor of Dental Surgery from the New

York College of Dentistry in 1870. He comes of a long line of solid Americans that included some of the best known of our naval, political, educational, clerical, and literary men, including the poet, Henry Wadsworth Longfellow.

During his long practice in Brooklyn Dr. Wadsworth's genial nature and public spirit made him quite prominent and popular. He was a member of the Second District Dental Society, of the order of Masons, of the New England Society of Brooklyn; was treasurer of the Homeopathic Dispensary and Hospital; a member of the Hanover Club and of the Amphion Musical Society. His wife survives him.

DR. ROBERT A. CARROLL.

DIED, at Flemington, N. J., October 6, 1895, of apoplexy, Dr. ROBERT A. CARROLL, in the seventy-fifth year of his age.

Dr. Carroll was born in Vermont, January 29, 1821. At the age of fifteen he went to Philadelphia and learned the jeweler's trade, after which he studied dentistry with Dr. Wm. Ripperger, and located at No. 4 South Thirteenth street, where he practiced for two years. In 1844, through the influence of friends, he was induced to settle in Flemington, N. J., where he built up and maintained a large and lucrative practice. He was in active practice until within four years of his death, when ill health compelled his retirement. A widow and two children survive him.

DR. ISAAC N. HODGEN.

DIED, at Woodland, Cal., November 29, 1895, of heart-failure, Dr. ISAAC NEWTON HODGEN, in the eighty-second year of his age.

Dr. Hodgen was born in Green County, Kentucky, March 2, 1814. He was reared with his father's family upon a Kentucky farm. At the age of nineteen he entered upon the study of medicine at Cincinnati. In 1835 he began practice in Mississippi, where he remained until 1840, when he returned to Kentucky, was married, and continued the practice of medicine in his native state for twenty-two years, with the exception of three years spent in Texas.

In 1862 Dr. Hodgen was forced to forego medical practice on account of increasing deafness, and began the study of dentistry, and in 1864 removed with his family to Lexington, Ky., where he began the practice of this specialty. In 1875, for the benefit of his wife's health, he sought the milder climate of California, finally locating in Woodland, where he practiced for fourteen years.

Dr. Hodgen was a man of great energy, perseverance, and industry, of most exemplary character, and an active Christian, being a member of the Christian Church for sixty-five years. He enjoyed an enviable reputation in his more active days as a practitioner of exceptional skill, and was the originator of many useful instruments and appliances. In earlier life he was an active member of several dental societies.

Dr. Hodgen was married, in Glasgow, Ky., September 23, 1840, to Miss Caroline E. Ritter, who died on October 11, 1895. He leaves four daughters and an only son, Dr. J. D. Hodgen, of San Francisco.

HINTS, QUERIES, AND COMMENTS.

AIR-CHAMBERS.—Writers still continue to assert the necessity for, and describe the methods of making air-chambers in full dentures. It seems as though an experience of fifty years, exclusively in prosthetic dentistry, dating back to the first "suction" plates, ought to demonstrate whether air-chambers are a necessity in full dentures.

My preceptor, Dr. Hanson, of Boston, so far as I know made the first suction plate, I think in the year 1844. The impression was taken in common beeswax; the die made of tin and the plate fitted to the entire palate. The adhesion was such that he tested its force by soldering a hook to the plate, attached a wire to it, and to this suspended a pail of water, and piling other weights upon it, the patient lifted and held the whole. All plates were thus made without air-chambers, which were not introduced until several years later and were known as the "Gilbert" air-chamber, the same as now used.

For more than twenty-five years I have discarded air-chambers in the full denture as unnecessary, and often very detrimental, in rubber, gold, aluminum, and the heavy continuous-gum work, in flat cases, high arches, ridges hard or soft, and no ridge at all. On my shelves are hundreds of models of every conceivable shape and condition, upon which dentures have been made, and all working successfully, and yet not an air-chamber in one of them.

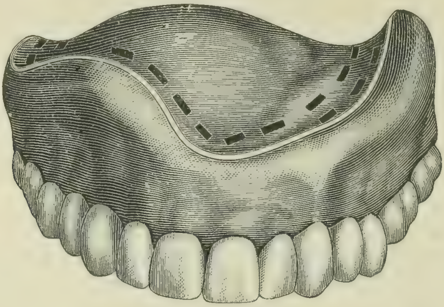
Now, there is one fact in connection with the upper jaw that seems to be largely overlooked. The center of the palate in 99 per cent. of cases is hard, and is the only portion of the jaw which never changes nor yields to pressure. As the alveolus gives way sooner or later, the plate will rest there and rock, and interfere seriously with its adhesion and stability. In metal plates I make a "relief" by covering the hard center with a thin film of wax, chamfering the margins to a thin edge, or flush with the model.

Now if there be an air-chamber its anterior and posterior margins must of necessity rest on this hard center, and in the course of time the plate is rocking and the air-chamber is worse than useless.

There is a small per cent. of cases where the center of the palate is soft, and there is usually a slight crevice. In such cases I make no change at all, but fit the plate closely to the entire surface, making sure that its margin fits snugly into the crevice. Upon trying the plate in the mouth I do not ask the patient to "suck it up," but am confident that the adhesion will be all right if I see no air-bubbles escape at the rear when pressing the plate with the finger in the center, having previously wet the palatal surface; and this, too, in view of the extra expense involved in making over a continuous-gum set, if the adhesion is not sufficient.

I find very many dentists have discarded air-chambers and other appliances for suction; and they are satisfied with the results. These unsightly objects in a metal plate and the unnecessary thickening of a continuous-gum denture can be entirely dispensed with in all cases. In rubber sets I bur with the large cone bur a portion of the rubber from the palatal surface.

Herewith is an illustration of the worst case for which I have made a denture in a practice of fifty years. On the right side a portion of the bone was removed on account of disease. The remainder of the ridge is thickened flexible membrane; the center of the palate is enlarged, quite prominent. I raised the model slightly over the right side where it is hard ; raised it as usual over the hard center, swaged an aluminum plate, and attached the teeth with rubber. The denture is one inch long in front to restore contour of face. The only favorable condition of the mouth is the retention of all the lower teeth. The patient told me after wearing the plate eighteen months he often forgot he was wearing artificial teeth. Had previously seven sets made by different dentists, none of which had been satisfactory. If an air-chamber is not needed in such a case, where is it a necessity?—L. P. HASKELL, Chicago, Ill.



CHLORO-PERCHA AS AN INSULATOR.—Before setting crowns or bridges on hypersensitive teeth, it will be found that thoroughly coating the entire surface of the tooth, or teeth, with a film of chloro-percha will prevent the pain experienced from thermal changes in these teeth after being crowned, and will also prevent the pain produced by the acid in the cement while setting the crown.—D. W. DILLEHAY.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

The abbreviations of titles used are those common to bibliographical work, and will, it is presumed, be readily comprehended by any one familiar with dental or scientific publications. Any explanation will be gladly furnished by the compiler. A star (*) indicates a Thesis.

Evans (Georg.) Kronen- und Brückenarbeiten. Deutsch von Friedr. Purlitz. Hamburg, 1895, Rademacher. 8°.

Kühns (C.) * Untersuchungen über die chemische Zusammensetzung der harten Zahnsubstanzen des Menschen in verschiedenen Altersstufen. [Erlangen.] Leipzig, 1895, A. T. Engelhardt, 35 p. 8°.

Lefert (Paul.) La pratique des maladies de la bouche et des dents dans les hôpitaux de Paris. Paris [1895], 1896. 16°.

Pitot (Pierre.) * Des accidents osseux de la dent de sagesse. Contribution à l'étude de leur pathogénie. Bordeaux, 1895, 51 p. 4°. No. 93.

Stocken (James.) Dental materia medica and therapeutics. 4. ed., revised by Leslie M. Stocken and J. O. Butcher. London, 1895, H. K. Lewis, 4 p. l., 155 p. 16°.

Action (An) for recovery of fees by a dentist. Lancet, Lond., 1895, ii, 1522.—

Alexander (C. L.) Suspension denture. Dental Cosmos, Phila., 1895, xxxvii, 1002–

1004.—**Allen** (H.) Adenoid growths of the pharynx. Tr. M. Soc. Penn., Phila., 1895, xxvi, 313-316.—**Amoédo** (O.) Contribution à l'étude de la correction du prognathisme. Odontologie, Par., 1895, 2. s., ii, 577-584.—**Annandale** (T.) Practical hints upon the operative treatment of cancer of the lip, face, mouth and throat. Edinb. Hosp. Rep., Edinb. & Lond., 1895, iii, 539-543.—**Avanzi** (R.) Contributo allo studio della fisio-patologia della polpa dentale. Atti d. xi. Cong. med. internaz., Roma, 1895, V, odontol., 15-25.—**Baumgardner** (E.) Dental hygiene. Ann. Hyg., Phila., 1895, x, 227-230. ——— A plea for the first permanent molar. *Ibid:* 603-608.—**Baurowicz** (A.) Zur Aetiologie der Pharynxstricturen. Arch. f. Laryngol. u. Rhinol., Berl., 1895, iii, 354-358.—**Beausoleil** (R.) De l'inflammation aigue de l'amygdale linguale. Rev. de laryngol. [etc.], Par., 1895, xvi, 1127-1132.—**Beers** (A. H.) Epulis. Am. J. Dent. Sc., Balt., 1895, xxix, 320-323.—**Bentley** (D. F.) Death from the administration of chloroform. Dental Cosmos, Phila., 1895, xxxvii, 1006.—**Berten** (J.) Hypoplasie des Schmelzes. (Congenitale Schmelzdefecte; Erosionen.) Deutsche Monatschr. f. Zahnheilk., Leipz., 1895, xiii, 425; 483; 533; 587.—**Blache** (R.) Moyen pratique d'obtenir l'antisepsie buccale et pharyngée (canule abaisse-langue de Guersant). Méd. mod., Par., 1895, vi, 737.—**Blanc** (H.) Deux cas de phlegmon sous-lingual avec phénomènes généraux graves et tendances à l'asphyxie. Union méd., Par., 1895, 3. s., lix, 565-570.—**Blankenship** (J. P.) Dentition. Nashville J. M. & S., 1895, lxviii, 237-240.—**Bourlet.** Fracture double longitudinale de la dent canine inférieure gauche; trismus; guérison. J. d. sc. méd. de Lille, 1895, ii, 555-557.—**von Bremen** (E.) Methods of bleaching teeth. Dental Jour., Ann Arbor, 1895, iv, 70-73.—**Burchard** (H. H.) Amalgams as chemical compounds. Dental Cosmos, Phila., 1895, xxxvii, 989-1002.—**Carmichael** (J. P.) Dental pyorrhœa and care of the teeth. Dental Rev., Chicago, 1895, ix, 783-785.—**Carreras** (P.) Sulla proprietà assorbente della polpa dentale: ricerche sperimentale fatte sopra diverse specie di animali. Atti d. xi. Cong. med. internaz., Roma, 1895, v, odontol., 26-28.—**Chandler** (Thomas Henderson.) [1824-95.] (Obituary.) Am. J. Dent. Sc., Balt., 1895, xxix, 375.—**Chloroform** (The) question. [Edit.] J. Brit. Dent. Ass., Lond., 1895, xvi, 649-652.—**Christensen** (W. E.) On porcelain inlay work. Dental Cosmos, Phila., 1895, xxxvii, 1037-1042.—**Coon** (W. W.) Fracture of the inferior maxilla, with treatment. *Ibid:* 1004-1006 —**Coulliaux** (A.) Nomenclatura dentale. Atti d. xi. Cong. med. internaz., Roma, 1895, v, odontol., 79-82.—**Coulon** (G.) Accès de laryngite striduleuse coincidant exactement avec l'éruption de certaines dents et cessant avec elles. Méd. inf., Par., 1895, ii, 643-647.—**Crozier** (J. B.) Chloroform in teeth extraction. Lancet, Lond., 1895, ii, 1457.—**Cunningham** (G.) Le traitement immédiat des irregularités des dents. Odontologie, Par., 1895, 2. s., ii, 584-597. [Discussion], 623-631.—**Custer** (L. E.) Electric heat in dental practice. Dental Cosmos, Phila., 1895, xxxvii, 1013-1020.—**Dalby** (Sir W. B.) Adenoid growths in the pharynx. Lancet, Lond., 1895, ii, 1349.—**Denham** (E. K.) A case of large round-celled sarcoma of the tongue. Am. J. M. Sc., Phila., 1895, n. s., cx, 259-261.—**Dennis** (G. J.) The advantages of electricity in dental practice. Dental Rev., Chicago, 1895, ix, 778-780.—**Dentistry** in Japan. Dental Reg., Cincin., 1895, xlix, 617.—**Dieck** (W.) Die Resultate der Untersuchungen über die Bodenbeschaffenheit in ihrem Einflusse auf die Caries der Zähne. Eine kritische Studie. Deutsche Monatschr. f. Zahnheilk., Leipz., 1895, xiii, 569-586.—**Disease** of the antrum of Highmore from a medical standpoint. Am. J. Dent. Sc., Balt., 1895, xxix, 349-356.—**Dmochowski** (Z.) Beitrag zur pathologischen Anatomie und Aetiologie der entzündlichen Processe im Antrum Highmori. Arch. f. Laryngol. u. Rhinol., Berl., 1895, iii, 255-353.—**Fillebrown** (T.) A new apparatus for continuing anesthesia while operating on or in the mouth. Dental Cosmos, Phila., 1895, xxxvii, 1007-1013. ——— *Also:* Internat. Dent. J., Phila., 1895, xvi, 731-736.—**Forsyth** (W. F.) Fractures of the jaw. Dent. Rec., Lond., 1895, xv, 533-542.—**Freeman** (S.) The use of compressed air in dentistry. Ohio Dent. J., Toledo, 1895, xv, 601-606. —**Freeman** (W. J.) Operative treatment of purulent disease of the antrum of Highmore, with exhibition of new instruments. J. Am. M. Ass., Chicago, 1895, xxv, 940-943.—**Gangolphe.** Corps étranger de l'œsophage (dentier). Lyon méd., 1895, lxxx, 392.—**Garretson** (James E.) [1828-95.] (Obituary.) Dental Cosmos, Phila., 1895, xxxvii, 1069. ——— *Also:* Dental Rev., Chicago, 1895, ix, 821.—**Godon.** Perforations pathologiques des racines. Odontologie, Par., 1895, 2. s., ii. 607.—**Grayston** (W. C.) Notes on the treatment and filling of teeth. Dental Rec., Lond., 1895, xv, 479-487.—**Grosse** (U.) Zur Casuistik der Zahncysten. Arch. f. klin. Chir., Berl., 1895, li, 436-448.—**Guerini** (V.) L'arte dentaria presso gli antichi popoli Italiani. Atti d. xi. Cong. med. internaz., Roma, 1895, v, odontol., 32-34.—**Harlan** (A. W.) Antiseptic dental surgery. Dental Reg., Cincin., 1895, xlix, 595.—**Heitmüller.** Die Principien der Behandlung von Zähnen mit gangränoser Pulpa und die Behandlung der Molaren mit Gangrän der Pulpa im Speziellen. Atti d. xi. Cong. med. Internaz., Roma, 1895, v, odontol., 28-32.—**Hewitt** (F.) An inquiry concerning the safety and sphere of applicability of chloroform in dental surgery. J. Brit Dent. Ass., Lond., 1895, xvi, 660-707.—**Hussey** (H. F.)

Evolution as illustrated by dentition. Dental Jour., Ann Arbor, 1895, iv, 101-107.—**Jamieson** (W. A.) On some superficial affections of the red portion of the lips. Brit. M. J., Lond., 1895, ii, 1410-1412, 1 pl.—**Joseph** (M) La membrane alvéolo-dentaire; (sa nature et son histologie). Odontologie, Par., 1895, 2. s., ii, 598-607. [Discussion], 618.—**Jung** (C.) De ziekten der weeke tandsubstanties en hare behandeling. Nederl. Tandheelk. Maandb., Roermond, 1895, ii, 1; 29; 53.—**Lauderdale** (H. H.) Primitive dentistry. Dental Jour., Ann Arbor, 1895, iv, 81-86.—**Lévy** (J.) De la profession et de l'instruction dentaires. Atti d. xi. Cong. med. internaz., Roma, 1895, v, odontol., 71-73.—**Magitot** (E.) La question du phosphore blanc. Progrès dent., Par., 1895, xxii, 307-313.—**Mason** (W. D. M.) Fracture of the superior maxilla. Texas Dent. J., Dallas, 1895, xiii, 94. ——— *Also:* Am. J. Dent. Sc., Balt., 1895, xxix, 357.—**Matteson** (A. E.) Treatment of irregularities of the teeth with cases. Dental Rev., Chicago, 1895, ix, 827-833.—**Mendelssohn** (J.) Contribution à l'étude de la prothèse immédiate; un cas de rhinoplastie sur appareil prothétique permanent. Atti d. xi. Cong. med. internaz., Roma, 1895, v, odontol., 41-45.—**Miller.** Inleiding tot de studie der bacterio-pathologie der tandpulpa. Neder. Tandheelk. Maandbl., Roermond, 1894, i, 220; 301; 1895, ii, 8; 36; 63.—**Papsch** (A.) Hypertrophie des Zahnfleisches. Atti d. xi. Cong. med. internaz., Roma, 1895, v, odontol., 47-49. ——— Ueber eine Behandlung des Antrum Highmori mit consecutiver Cystenbildung. *Ibid:* 49. ——— Ueber vitale Vorgänge in den Zähnen. *Ibid:* 50-63. —**Patterson** (J. D.) Epilepsy from dental irritation. West. Dent. J., Kansas City, 1895, ix, 481-484.—**Pearson** (N.) Sixth-year molars. Am. J. Dent. Sc., Balt., 1895, xxix, 314-320.—**Peterson** (F.) Deformities of the hard palate in degenerates. Internat. Dent. J., Phila., 1895, xvi, 719-731. [Discussion], 752-762.—**Platschic** (C.) Odontometria giudiziaria. Atti d. xi. Cong. med. internaz., Roma, 1895, v, odontol., 63-69.—**Rimes** (M. B.) Primal cause of dental caries. Dental Rev., Chicago, 1895, ix, 853-859.—**Roughton** (E. W.) Tumours of the gum. Brit. J. Dent. Sc., Lond., 1895, xxxviii, 1071-1077.—**Sauvez** (E.) De l'anesthésie locale par le froid. Atti d. xi. Cong. med. internaz., Roma, 1895, v, odontol., 38-40.—**Sedgwick** (W. H.) [1833-95.] (Obituary.) Ohio Dent. J., Toledo, 1895, xv, 656.—**Simms** (W.) The mechanical training of the dental student. Brit. J. Dent. Sc., Lond., 1895, xxxviii, 1057-1065.—**Simons** (B.) Cleft palates: cases in practice. Am. J. Dent. Sc., Balt., 1895, xxix, 369-373.—**Smith** (E. B.) Pathological lesions of the inferior maxillary bone, with report of a case. Tr. Mich. M. Soc., Grand Rapids, 1895, xix, 224-230.—**Somigliana** (M.) Sulla medicazione antisettica della bocca. Atti d. xi. Cong. med. internaz., Roma, 1895, v, odontol., 82-88.—**Taylor** (S. J.) Adenoid growths in the pharynx. Lancet, Lond., 1895, ii, 1457.—**Tomes** (Sir John.) [1815-95.] (Obituary.) Brit. M. J., Lond., 1895, ii, 396. ——— *Also:* Lancet, Lond., 1895, ii, 352. ——— *Also:* Deutsche Monatschr. f. Zanhheilk., Leipz., 1895, xiii, 518-520.—**Turner** (H. W.) Neuralgia. Dental Rec., Lond., 1895, xv, 488-493.—**Warnekros.** Die Entstehung der anomalen Zahnstellungen. Atti d. xi. Cong. med. internaz., Roma, 1895, v, odontol., 5-9.—**Weil.** Ueber Amalgame und deren Verbindung mit Cementen zu Cement-Amalgam-Plomben. *Ibid:* 10-15.—**Witthaus.** Ueber den Einfluss der Erblichkeit erworbener Eigenschaften auf das menschliche Gebiss. Deutsche Monatschr. f. Zahnheilk., Leipz., 1895, xiii, 521; 601.

LIST OF UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING DECEMBER, 1895.

December 3.—No. 550,808, to Emile de Trey. Dental gold foil.
" *10.*—No. 551,190, to T. G. Lewis. Dental bracket.
" *17.*—No. 551,610, to C. L. Alexander. Tool-holder.
" " No. 551,650, to Bernard Rein. Vapor dental furnace.
" *24.*—No. 551,763, to Wm. Hahn. Dental engine driving-head.
" *31.*—No. 552,114, to James Frye. Tooth-brush.
" " No. 552,185, to C. S. Kellogg. Hand-piece.
" " No. 552,192, to W. C. Middaugh. Dental syringe.
" " No. 552,203, to C. H. Seeger. Artificial tooth.
" " No. 25,028, to A. W. Browne. Design for box for electric motor.
" " No. 25,029, to J. G. Hollingsworth. Design for dentists' die-plate.

S. R. Bingham

THE F. GUTEKUNST CO., PHILA.

THE

DENTAL COSMOS.

VOL. XXXVIII. PHILADELPHIA, MARCH, 1896. NO. 3.

ORIGINAL COMMUNICATIONS.

PLANTATION OF TEETH.

BY LOUIS JACK, D.D.S., PHILADELPHIA, PA.

(Read before the Academy of Stomatology, December 17, 1895.)

THE planting of teeth is divisible into three classes:

1. *Transplantation*, where teeth removed from one subject are with proper precautions placed in the alveolus of another immediately after the extraction of a diseased or fractured tooth.

2. *Replantation*, where any given tooth of a person for various reasons may have been removed, and, after certain manipulation of the tooth and treatment of the socket, replaced.

3. *Implantation*, where an artificial alveolus is made by trephining the process at a vacant place, in which opening a suitable natural tooth is introduced.

Transplantation has been credited to Dr. John Hunter, but undoubtedly had been done before him. Directly after his demonstration of the feasibility of the procedure the operation was frequently performed in England, France, and to some extent in this country. The required conditions at that time were that the tooth to be transplanted should in size and form be as near as attainable the same as the one to be substituted, and necessitated one person, for a consideration, to yield the organ for the benefit of another. The removal of the tooth and the substitution were made immediately, it being considered essential that the operation be done under conditions favoring direct union.

This operation soon fell into disuse for reasons which are now clear. Dangerous inflammation frequently occurred by the transmission of disease from one subject to another, and more frequently, probably by introduction of pathogenic germs, serious disorders, sometimes followed by death, ensued.

Apparently the first described attempts in this country of the transplantation of dried teeth which had been long removed appeared in a paper, by Dr. S. P. Cutler, read before the Odontological

Society of New York, January 16, 1877. An abstract of cases is that two waste upper bicuspids were inserted side by side. After six months, on account of pain in the maxilla, the second bicuspid was removed, requiring considerable force to displace it. The first was permitted to remain.

Case II.—A first bicuspid was removed; the roots broke off, were then drilled out, and the septum of bone between them drilled away. An old tooth was fixed in the socket which after ten months was firm.

Here, in passing, occurs not only the earliest attempt to use dried teeth, but also, by drilling the socket to change the form, the first suggestion of implantation appears.

For the report and discussion, see DENTAL COSMOS, vol. xix, p. 258 *et seq.*

It should be noted here that John Hunter stated that many dentists prefer dead teeth, and, further, that he had seen dead teeth become perfectly firm after insertion, and do service for many years.

Replantation is not traceable to any authority for its beginning. It probably had its rise in the natural tendency to replace teeth dislocated by accident or removed by mistake. Our literature shows that for this purpose it was generally successful without the care which would now be exercised to insure a safe result. Within recent periods it has been performed as a means of effecting the cure of chronic alveolar abscess and other disorders of the root. The results have generally been reported as curative. This practice has been confined to the more careful and judicious practitioners, which is borne out by an examination of the literature of replantation.

Successful treatment in this manner and for this latter purpose became coincident with the scientific practice of aseptic surgery. Without careful consideration of the application of the principles governing asepsis, replantation in disordered conditions of the teeth and peridental membrane would be as liable to failure and as dangerous as transplantation in the previous century.

The *rationale* of the treatment here would appear to be, if we exclude the influence of shortening the root and occluding the root-canal, that the traumatism induces for a time an acute or subacute condition for the previous chronic one.

The relation of failures in replantation and transplantation previous to 1885 should be ignored. A tooth extracted and handled necessarily becomes an infected thing, and without disinfection its presence in the tissues of the alveolus involves a continuous struggle between the vital forces of the part and the development of bacteria. But through all these influences occasionally replanted and transplanted teeth remained for many years. I know of a case of a man who had an inflamed lateral incisor removed. The pulp had been devitalized. Deploring the loss, he replaced it on retiring for the night. On arising it had escaped. Not to be outdone, he tore from his handkerchief a narrow part of the selvage, and with this tied the tooth to one of the adjacent ones. It remained for fourteen years.

Implantation was undoubtedly originated by Dr. Younger, whose claim has not been publicly disputed. The date of his first operation was June 15, 1885. The general procedures of this operation as practiced by him are so familiar that it is needless here to repeat them.

The result of the fixation of an implanted tooth when it has been properly adjusted and held in position has become indisputable. The evidence presented by men of reliability and sincerity of purpose has too much accumulated to fail to be convincing as to the feasibility of implantation.

There are certain requirements already established which govern success. The artificial opening must have the depth to give correct occlusion, and be but little larger than the root of the tooth to be inserted. The opening in the gum should be smaller than the cross-section area at the cervix of the tooth. The mouth should be disinfected. The operator's hands and all instruments must be put in an aseptic condition. The tooth should be rendered impersonal and aseptic by being heated in a disinfectant fluid. The tooth should not have shreds of peridental membrane upon it, but should not be scraped clean of the adherent portion of the membrane. During intervals of the operation the socket should be filled with a tent of the antiseptic fluid in use. When the tooth is inserted it is better that some force be employed to push it into place. It should then be securely fixed in position by some means which will give immobility.

With the exception of the formation of the opening in the gum and the trephining of the process, implantation has no essential differentiation from the requirements governing transplantation and replantation.

With this outline I will proceed to describe the methods I have pursued in the cases under my care.

The most important qualification connected with these operations is the means to secure thoroughness of asepsis. The usual reliance has been upon bichlorid of mercury. I have avoided its use on account of its irritating influence and its depression of the vital force of the tissues, and have relied upon the aqueous solution of hydronaphthol and the aqueous solution of acetanilid.

The former is soluble in the proportions of 1 to 300. The latter is freely soluble in the ratio of 1 to 200. To effect the solution of hydronaphthol it is first dissolved in alcohol, when it becomes entirely miscible in water. In these proportions neither is irritating to the tissues, and, when heated, thoroughly effect the disinfection of the tooth, the hands, and instruments. The importance of heating disinfectant solutions to increase their power has been well established. (For example, with bichlorid of mercury 1 to 20,000 of urine at 104° F. prevents fermentation. Anthrax spores lose their infecting power in weak solutions of the ordinary antiseptics at 170° F.) In each case I place the tooth in either of the above disinfectant solutions and raise the temperature to the boiling-point. The instruments likewise are heated in the same manner. These and the tooth are kept in the fluid in the intervals which occur during the surgical procedures.

Generally I have subjected the selected tooth to this process for a short time after opening the pulp-chamber to disinfect the root-canals.

The importance of securing immobility of the planted tooth cannot be over-estimated, since the structural changes which produce the union of the tooth cannot be expected without a state of rest. It must be as essential here as in the case of fractures, since the process of ankylosis must be analogous to the process of the union of bones. Therefore, I emphasize the necessity for absolute fixation. I take an impression in plaster, and upon the cast make a study of the case. The tooth is fitted in the plaster to correct relations with adjoining and the occluding teeth. It is then secured in place, when a metal cast is taken, and upon this is fitted a gold splint of whatever form and with whatever attachments may give stability. This is secured by clasps or by wire ligatures to the other teeth at the cervix. Additional security and cleanliness is effected by setting it in place with phosphate of zinc.

For the front teeth, which are the most difficult to fix, I open into the pulp-chamber on the lingual surface and insert a wire parallel with this face. The splint is formed to pass between the pin and the tooth. This, if the splint is secured to the adjacent teeth, establishes the fixation in each direction.

These mechanical preparations may appear to some to be unnecessarily tedious. I have to state upon this point that in a question where success depends upon careful observances these precautions are essential.

To protect the surface of the root from injury during these procedures, it is covered with a strip of mucilage paper wrapped upon it, or a layer of floss silk. To prevent drying out, the cast is covered with damp paper or kept in a box among damp paper.

The final operation upon the mouth is simple, and is speedily done. It is, as above stated, preceded by every aseptic precaution.

In respect of replantation and transplantation, I invariably have broken up the remains in the alveolus of the peridental membrane. My impressions have been that this places these cases in the same relations which occur in implantation. The grounds for this procedure are that the experience of those who have replanted and transplanted teeth were of very frequent failure by early resorption, while the implantations when carefully performed have given favorable results.

I have *implanted* four cases; of these, three became fixed with apparent calcific support.

No. 1. Left upper central, male; operation April 20, 1889. In a few months it became firm and remained so for six years and five months, when it suddenly became loose and fell away. At the time of the operation the patient was in good health, but for a year or more before the resorption he had failed in vigor.

No. 2. Right upper lateral, male; operation January 12, 1895. The tooth became attached quickly, and is now resonant.

No. 3. Right upper central, same patient as No. 2; operation same date. On account of the occlusion of the lower tooth upon the tongue of the splint, secure attachment failed. It was removed December 7, 1895, when another tooth was inserted. It is notable that the alveolus had contracted as the root became diminished by resorption, and required deepening and enlargement to receive the new tooth. The location of these teeth had been edentulous for thirty years.

No. 4. Right upper first bicuspid, male; operation April 23, 1895. Progressed favorably; splint removed in four months. Tooth now very resonant.

My transplantations have been five.

No. 1. Left upper lateral, female; operation October 22, 1892. Tooth dead; deep pocket on palatal aspect; fistula on gum on labial aspect; apex of root much denuded of membrane and quite loose. Deepened the alveolus and firmly splinted the case; splint removed in five months; calcification was not established until four months afterward. The tooth remains perfectly firm, and is very resonant.

No. 2. Right lower lateral; operation October 10, 1894. Profound pyorrhea, with much resorption of margins of alveolus; patient not of good health; tooth became fastened by connective tissue, but it failed to become firm and was removed in six months. Here I was unable to attach a splint, and relied upon wire ligatures, which were not sufficient to prevent motion.

No. 3. Left upper lateral, male; operation January 12, 1895. The root here was deeply split, the parts much separated, thus enlarging the alveolus. The gum quickly embraced the root. In a few weeks the tooth became firm; it is now very resonant. Here the face became swollen, with perceptible heat, which quickly responded to treatment.

No. 4. Left upper cuspid, female; operation March 12, 1895. Here the tooth had been nearly disconnected by pericementitis; excessive flow of pus; outer plate of alveolus very much destroyed. The alveolus was fully sprayed with the solution of acetanilid; a tent also of lint saturated with an alcoholic solution of the same was applied for a few minutes. The next day swelling of the tissue about the tooth occurred. The face over the canine fossa was suffused and swollen; refrigerated face and sprayed gum with acetanilid one-half per cent. In two days these appearances subsided; no trace of pus could be elicited by pressure over the tooth. November 9, after eight months, the tooth being resonant, the splint was removed. This case is remarkable from the extent of resorption of the alveolus, and from the free suppuration consequent upon the depth of the pockets.

No. 5. Right upper second bicuspid, male. The tooth very loose from pericementitis; process much resorbed, but no discharge of pus at the time; tooth removed November 2, 1894; operation twenty days later. The fixation by splint was not secure from disturbance by the occlusion of the lower tooth. There is now no indication of calcification.

Of replantations I have had three cases.

No. 1. Right upper first bicuspid, female; operation November 3, 1894. Displacement outward by pericementitis, with resorption of outer wall of alveolus. Reformed the socket to secure alignment. In three hours replaced the tooth. Removed splint in six months. The tooth is now firm and very resonant.

No. 2. Right upper lateral, female; operation January 19, 1895. Tooth disturbed outward and posteriorly, displacing the lip, caused by pericementitis. Deepened the alveolus and reformed it to secure alignment. Management same as in previous case. The gum became slightly inflamed, which passed away in six days, and the splint was removed at end of June. Tooth firm and resonant.

No. 3. Right upper central, female; a case of pyorrhea with enlargement of the alveolus; operation March 23, 1885. Here, because the remaining adjacent teeth were not firm, a state of immobility could not be secured. The ultimate attachment is doubtful.

The apparent promising results in teeth deeply affected by the consequences of pericementitis is an important conclusion to be drawn from several of the above cases.

I have alluded to the means taken to keep the root clean and protect the surface from injury. If a protected root apparently free of portions of the peridental membrane be immersed in warm water or a disinfecting solution the surface slightly swells, becomes velvety to the touch, and is viscid. It is a rational conclusion that the plasma effused into the space surrounding the planted tooth must necessarily come into more intimate connection with the tooth in this condition than would be the case if the root were polished. Moreover, a tooth in the condition stated when removed during the operation for adjustment exhibits a considerable degree of resistance to displacement, which I have attributed largely to this condition.

Since the appearance of Dr. Oscar Amoedo's paper upon "Implantation of Decalcified Teeth," read before the International Medical Congress in 1894 (see DENTAL COSMOS, vol. xxxvi, p. 680), I have in each case partially decalcified the cementum, being careful not to carry the process so far as Dr. Amoedo recommended. The partial decalcification cleanses the surface, removes any slight traces of calculus, and softens somewhat the surface, and is in line with the hypothetic reasons given above for the retention of the viscid coating of the pericementum.

The decalcification is not done until after the previously-described mechanical procedures, and only shortly before the insertion of the tooth and immediately after the final disinfection.

The question pertinently arises whether the remains of the cementum covering the root, along with the morphological change induced by the decalcification of the surface of the cementum, may not act as a matrix to assist the organization of the plastic elements effused. While it is not in agreement with histology that dead animal substance can become revivified, it is not an irrational hypothesis to account for organization of plasma taking place under the influence of the morphological arrangement of tissue which afterward may become resorbed. In these cases, too, the teeth assume a freshness of color scarcely distinguishable from living teeth, and much different from the tint they have after their disinfection and complete preparation. This phenomenon, which cannot be vital in its nature, indicates that the influence of the fluids of the part has a marked corrective effect upon the shade of the tooth.

The condition of the surrounding tissues after these operations presents a surprisingly small degree of disturbance. When inflammation appears it does not run high, is little disposed to become diffused, and quickly yields to mild refrigeration. The general view is that the absence of any inflammatory symptoms is salutary. This may arise from the dread involved in the word, based as it probably is on the disturbing effects of that condition common to the period previous to knowledge of the methods to secure asepsis. But when reparative action is desired, a certain and limited degree of excitement of the neighboring tissues is necessary to induce the supply of the plastic element required, and to set in motion the cell-development which conducts the reparative effort which closes the breach of continuity. This would appear to coincide with what takes place in simple fractures, as, when the neighboring tissues are somewhat lacerated by the separation and displacement of the fractured ends of the bone, the amount of callus is more abundant than in pipe-stem fractures, when in some instances the bones fail to be surrounded sufficiently at the seat of the fracture, and are feebly supported during the completion of calcification. May not the same principle obtain here? If the effusion of plastic matter is slight, and confined to the space between the root and the wall of the alveolus, it is reasonable to infer that the calcific connection will be comparatively thin, whereas, if the inflammatory process were deeper and more acute than is here usual, the plastic matter would fill the contiguous alveolar spaces to greater depth, and therefore we should expect a larger zone of calcific deposit about the root.

It should be held in view in this connection that the cancellated portion of the alveolar process contains an extremely small amount of osseous tissue. In view of this fact, it is important to the secure fixation of planted teeth, and of the permanence of their attachment, that the area of calcification should be extended beyond close proximity to the root of the planted tooth. Close observation, in connection with control of the secondary disturbances instead of alleviation of the inflammatory condition, is needed to establish this conclusion. If such a conclusion be reached, it would appear correct to induce a greater disturbance of the tissues than is ordinarily produced by the operation.

We have in this connection the supporting fact that osteitis of the alveolar process not attended by formation of pus is followed by calcification of the cancellated portion, and that the ossification is persistent.

In my cases, where the inflammatory indications have been most apparent and longest continued, the attachment has been earlier established and the ultimate resonance more marked than when no signs of secondary disturbance have been noticed.

The character of the union and the histological process by which this is brought about is the most important scientific consideration which is presented in connection with the plantation of teeth. Is it an encystment where the root is only tolerated until some local disturbance or constitutional depression occurs to bring about a retrograde process to expel the intruded tooth? or is it ankylosis where the osseous reproduction fuses the tooth to the neighboring lattice-like formation surrounding it?

The observations bearing upon these questions have not been conclusive. They have been made upon displaced teeth which have either failed to become united to their surroundings, from either local or other causes, or they have been upon teeth which, after calcification had been secured, have undergone resorption, and therefore have not told the character of the connection. We lack the observation of such teeth at their best results to determine the process of the repair of the breach between the root and the environment.

As all healing of wounds is by one method, that of organization, it is only necessary to bring to bear the observed facts which have been determined by the insertion in the tissues of pieces of dried lung, of sponge or pith. There quickly appears congestion about the irritant, then exudation of fluid and solid elements; the former penetrates the pores quickly, the latter slowly. Next follows the development and proliferation of connective-tissue cells and the formation of granulated tissue with development of blood-vessels.

The connective-tissue cells undergo differentiation in accordance with the tissue which is to be formed or reproduced in reparation, and are variously named as fibroblasts, osteoblasts, odontoblasts, etc.

In the process of reparation under consideration another phase of it enters into view. When dried pieces of lung-tissue are inserted for experimental observation, as previously alluded to, the leucocytes during the process of organization remove all traces of these; but if the irritant is of such a nature as to be intractable to these, another element appears,—the giant-cell, the function of which is eliminatory.

If the leucocytes have the ability to remove the viscid film of the peridentium and to take up the small amount of exposed decalcified tissue, there would appear no difficulty in the organization of the osteoblasts and the embracement of the root by their prolongations. If, on the other hand, the remains of these structures will not be accepted by the former cells, the giant-cells will remove them. When this action has taken place after plantation of teeth the process does not stop here, but the cementum is attacked. The views of Amoedo and others are that this is the necessary action, and that after a time this ceases, and calcifications take place in the bays so produced, and thus by the subsidence of resorption and the deposit of a layer similar to cementum the tooth becomes fixed.

This to me is a problematical result, since in each such case I have observed the surface of the root had been placed in a more irritating condition by the acute margins and sharp spiculation, so that reparation would appear questionable.

I have therefore aimed to render the tooth as slightly irritating as possible, by careful preparation, by partial decalcification, by the use of mild and stimulating aseptics combined with the most absolute rest, and the continuance of this state until resonance appears.

It is unfortunate that in too many instances planted teeth, which have become fixed and useful organs, have after several years, from causes not entirely clear, yielded to resorption and have become useless. The termination of these cases seems to come on with suddenness and without warning of the resorptive process. The cause of this result we have to look for in a depressed trophic state of the environment, in which condition it is not unreasonable to expect tissue of repair to be the first to yield. In any defective condition of the nutrition of a part this result is in consonance with well-fixed principles.

We have also to consider that the alveolar process is a provisional structure, and that its tendency is, on the occurrence of irritation or of impaired nutrition or by static conditions, to yield to resorption. The fact that it is provisional would impress upon it the tendency to this structural change.

Notwithstanding the prognosis of planted teeth is at present precarious, the promise of useful operations is so large, when selection is made of subjects in sound health and without cachectic taints, that, where plantation is required for the good of the patient, it should be performed. The probabilities are that greater experience will lead to improved methods and more certain results.

ALVEOLAR ABSCESS: PREVENTIVE AND CURATIVE TREATMENT.

BY M. L. RHEIN, M.D., D.D.S., NEW YORK, N. Y.

(Read before the Second District Dental Society of the State of New York, December 9, 1895.)

By alveolar abscess we understand a pathological condition involving the infiltration of some portion of the alveolar process of the maxilla with purulent matter. As it is my purpose to speak to you concerning the treatment of this disease, I will devote very little attention to its pathology and etiology.

The disease is generally divided into two forms—acute and chronic.

Acute Alveolar Abscess.

Presuming that the causes and symptoms of this form of the disease are familiar to you all, I desire to call your attention especially to the necessity for the most careful and thorough treatment pursued under the strictest antiseptic conditions, if it is to be hoped that a radical cure will be accomplished. If these precautions are followed out with any ordinary common-sense treatment, a cure is readily effected. It is, however, unfortunately true that the graver form of this trouble—chronic alveolar abscess—results more frequently from a lack of attention to these precautions, namely, from improper dental work, than from any other source. A large portion of the treatment is necessarily the same, whether we have an acute stage of the disease or the chronic form.

It falls very frequently to the lot of the dental practitioner to be placed in the happy position of being able to prevent an acute attack of alveolar abscess, and I shall therefore first take up your attention with this phase of the subject.

One of the errors commonly made in this disease is to delay operative treatment until pus has thoroughly formed and an external fistula is obtained, where frequently prompt antiseptic and surgical measures would prevent the threatened attack. With our present knowledge of the value of the more powerful germ-killing remedies, there remains no excuse for any delay in opening into the pulp-chamber of any tooth at any stage of this disease, or of a threatened attack of the disease.

The first step in the treatment of a tooth threatened with an alveolar abscess—and I may as well say in one where the disease exists in any stage—is the adjustment of the rubber-dam over the diseased tooth, in order to preclude the possibility of the entrance of any o the germs in the oral secretions into the pulp-chamber. This should be the invariable rule.

The opening into the pulp-chamber should always be made on a direct line (or as close to that as possible) with the end of the root in single-rooted teeth, or on a line as far as possible commanding the ends of multi-rooted teeth. Do not fall into the error of utilizing an already established approximal cavity for this purpose. Many teeth have been ruined in this way, because the operators for the time being thought they would save themselves the trouble of cutting through solid enamel. Do not depend upon a small opening, but make it so large that there will be no question of an unobstructed view of the root-canals. It is far safer to remove a large quantity of healthy tooth-structure which can be perfectly restored by suitable filling-material, than to be compelled to operate in root-canals entirely by the sense of touch. The openings of the canals themselves should be more or less enlarged by the use of suitable drills. The contents of the canals should then be thoroughly removed, and by the careful performance of this portion of the operation is determined the successful prevention of the onsetting attack, or the cure of the disease, if it already exists.

As to the method of removing pulp-tissue in root-canals, it would be folly to lay down any one individual form of practice. The judgment of each operator must guide him in the choice of the best method for each individual case. There is no occasion for dilating upon the necessity of a thorough removal of the pulp-tissue and the hermetical sealing of the ends of the roots, as well as of the canals themselves. Many cases of what within a few hours would result in an attack of acute alveolar abscess present themselves to us before any purulent matter has formed. In these cases the patients are simply suffering from the intense pain that generally accompanies the oncoming of such an attack. Prompt antiseptic treatment of such cases, undertaken at an early stage, will generally abort the attack, and as the treatment pursued is the same as if pus had already formed, we will consider the treatment of such cases together.

Where there is no question but that the roots are straight, no better means of removing the contents of the diseased pulp-periphery of the root itself can be found than the Morey drill. The bad odor attached to the operation of drilling root-canals is due entirely to the attempted performance of this operation in roots where it is a mechanical impossibility. In such cases, having removed with the broach as much of the pulp as possible, we must then depend upon chemical means for completing our work of removing the remainder of the pulp *débris*. For this purpose two excellent agents have been introduced within the last few years. The one first brought to our notice by Dr. Schreier, of Vienna, consists of a combination of potassium and sodium, which has been so frequently explained that it is unnecessary for me to dilate upon it. Another method which accomplishes the same result, namely, the destruction of all the soft tissue leading to the very end of the root, is the introduction of a fifty per cent. solution of sulfuric acid. By either of these means it will be found possible to reach the very end of every canal. The canals should then be thoroughly washed out by an injection of a powerful antiseptic solution. One that is most acceptable for this purpose is a 1-500 solution of bichlorid of mercury in hydrogen peroxid. This should be injected into the canals of the tooth with considerable force, by means of a hypodermic syringe with a platinum needle. Where pus has already begun to form, the forcing of a portion of this solution through the foramen of the root is productive of considerable pain to the patient, lasting sometimes for as long a period as one or two hours. On this account it has been generally condemned, and efforts made to cleanse the canal without using sufficient pressure to drive through the foramen any of the solution. This I believe to be a serious error of judgment. It is far preferable that the patient should suffer from the powerful effects of this antiseptic coagulating fluid on the tissues of the apical space, than to run the risk of leaving some minute portion of infiltrated purulent matter, which might proceed to further development of an abscess. I have seen many cases of alveolar abscess aborted by this method of treatment, where considerable pus had already been evacuated. The canals should now be thoroughly dried and a dressing of Ceylon cinnamon oil packed therein, hermetically sealed with gutta-percha, and allowed to remain until all symptoms of irritation have disappeared.

In other forms of acute abscess, where the infiltration of pus has already extended to some depth into the alveolar process, or where an external sinus has already been established, it is necessary, after the end of the root has been reached, to enlarge the opening at the apical point and thoroughly cauterize the tissue in the apical space by means of the same chemical agents used to reach the end of the root. Where the external sinus already exists, the injection of the bichlorid solution should be so thorough that the fluid will make its exit through the external sinus.

Beware of over-treatment in these cases. At the very same sitting, the canal having been thoroughly dried, the end of the root should at once be hermetically sealed by chloro-percha, and the patient should then be instructed in the use of a proper antiseptic mouthwash. No further operative interference ought to be necessary.

Where, however, no external opening has been obtained, and we have infiltration of pus extending to more or less depth in the alveolar tissue, it is necessary to move with more caution. In these cases, a similar dressing of cinnamon oil packed in the roots is advisable, and generally it is found necessary to renew this on one or two occasions, until we are certain that every vestige of the purulent infiltration has been destroyed.

It might be well to devote a little attention to the question of the number of alveolar abscesses that are occasioned by attempting to conserve pulps either exposed or diseased. At the present time we do not hear nearly so much about the conservative treatment of the pulps of teeth,—a subject which ten years ago was worn threadbare at our dental sessions. The majority of observant practitioners have learned to radically modify their practice in this respect; at the same time, very few of them have had the courage to present to the profession the results of their modified course of treatment. In order to prevent the possibility of an alveolar abscess in well-formed adult teeth, it has become almost an invariable rule with me to remove a pulp if it be at all exposed. There is another class which requires such treatment, and which we meet especially in the large cities among the highly-strung, nervous organizations which produce so many pathological conditions. All of us occasionally come across alveolar abscesses due to the death of the pulp in a tooth which has never been attacked by caries. The percentage of such teeth among the active brain-workers in a city like New York is very large, and it is our duty to look out for such cases, especially in patients subject to attacks of pyorrhea alveolaris. The pulps in these teeth do not die rapidly, but it is generally a slow and gradual cessation of vitality due either to a lack of nutritive substance, or, in some cases, to the extraordinary irritation produced by acute pericemental attacks. It has been a long-standing rule with me, in the treatment of severe cases of pyorrhea alveolaris, to diagnose as carefully as possible the amount of vitality in the pulps of the individual teeth which are badly affected. This is accomplished by placing the rubber-dam over each of such teeth in turn, and testing it with a spray of chlorid of methyl. Any other intense cold or heat will answer the same purpose. In most of these cases, illumination with the electric light is of very little value. As soon as one of these teeth shows a lack of appreciation of intense cold, it has become my practice to enter the pulp-chamber and thoroughly remove the contents of the canal, and treat in the manner I have outlined above. A large number of these cases, if operated upon at the right time, will show the pulp-contents to be devoid of any vitality up to within a very short distance of the end of the root.

The result of leaving such pulp-tissue undisturbed for a longer period of time means the eventual loss of life of the remaining small portion of the pulp, followed generally by an alveolar abscess which in many cases may not even be diagnosed, as they frequently open into the pyorrheal pockets that are present in such mouths, instead of burrowing through the alveolar plates, as is the common result in acute alveolar abscess in normal teeth.

There is also another class in this category, where the life of the pulp at its entrance into the tooth is destroyed, while some vitality remains in the canal proper, nourished for the time being through the pericemental circulation. The removal of the pulps of such teeth is not only essentially necessary to the proper local treatment of the existing pyorrhea, but is generally preventive of subsequent attacks of alveolar abscess.

Summarizing the treatment of the acute stage of alveolar abscess, it means nothing more nor less than the complete abolition of the diseased zone of tissue, leaving to nature the absorption of the coagulated material formed ; at the same time avoiding over-treatment, the danger of which consists in leaving the tissue so indurated that it cannot possibly be absorbed ; consequently a chronic abscess due to mechanical causes is frequently the result.

Chronic Alveolar Abscess.

The same principles that apply to the treatment of the disease in the acute form hold good here, except that, if possible, a more thorough form of procedure is necessary. In the treatment of a case of chronic alveolar abscess, the first requisite (as it should be in all diseases) is the making of a thorough diagnosis. By that is meant (in this disease) so thorough an examination of the gums, roots, and all the adjacent parts, by means of probes, electric light, touch, etc., that a very clear understanding is obtained of the pathological conditions from an anatomical standpoint.

Having these conditions clearly outlined in our minds, it is absolute folly to pursue any preliminary treatment of such a tooth. Our object and aim should be to eradicate as rapidly as possible every vestige of diseased tissue, and then allow nature to close the wound.

The first step is necessarily the thorough exploration and cleansing of the canals to their very end. No obstacle in the shape of prior fillings or treatment should be allowed to interfere with this operation. Having thoroughly accomplished this object, no further benefit can be obtained by internal treatment ; so that it is generally wise to fill such a canal at the first sitting, if it has been cleansed to its very ends.

In all forms of chronic alveolar abscess, there is present more or less caries of the outer periphery of the end of the root, as well as of the alveolar plate in which the root is imbedded. As long as any of this necrotic tissue is allowed to remain *in situ*, it will be impossible to effect a permanent cure. Surgical interference is logically the only resource at our command.

The greatest criticism that can be passed upon us as a profession, in treating diseased conditions of this nature, is that by reason of the minute character of the daily work in which we are engaged, when we come to operate upon diseased tissue we have a strong inclination to err by being too conservative in the scope of our operative interference.

If we desire to cure chronic alveolar abscess, we must throw aside all that delicacy of touch which is our daily pride in ordinary dental operations. In order that there may be no question of having left behind any diseased tissue, we must follow the example of the general surgeon, and enter freely into the zone of healthy bone and tooth-structure.

The incisions should be made sufficiently large, so that by means of sharp burs in the dental engine we may readily remove an ample sufficiency of the bone in the diseased tract. In all these cases, the most efficient method is to take the ordinary fissure-drill in the dental engine (the sinus having been enlarged by trephines or otherwise), pass it down the tract along the side of the diseased root low enough toward the crown of the tooth to be certain that you have passed into the healthy tissue, and there, by means of the drill, amputate that portion of the root which is necrosed.

In some cases this operation is surprisingly easy, while in others it will be found more or less difficult of procedure. No matter what obstacles may have to be surmounted, if the tooth is one that is to be preserved in a healthy condition, it will be found to be the only safe method that can be pursued. In many cases it will be necessary to place the patient under the influence of a general anesthetic, especially where it is necessary to bur away the diseased portion of the alveolar process, in order that the end of the amputated root may be removed.

A common mistake of dentists is to look upon this operation as something beyond their scope, and to fear the treading on what they might term dangerous surgical ground.

It would surprise many who are unacquainted with this operation to discover what a simple affair it becomes after they have amputated the ends of a few roots. No one is better constituted to perform such an operation than a good dentist, and in no place are there such facilities for properly performing the operation as are found in a properly-equipped dental office.

The most difficult form of cases that require surgical interference are those which have no external opening, but from time to time visibly demonstrate to the patient that something serious is amiss. I refer specially to those cases known as "blind abscesses." The internal treatment of the roots having been performed as heretofore described, it is necessary to make an artificial sinus directly to that portion of the root where we wish to sever it from the main body of the tooth. If no general anesthetic be administered, the gum at this point should have injected into it about ten minims of a four per cent. freshly-prepared solution of the hydrochlorate of cocain. A trephine rapidly revolved in the engine will very quickly and almost painlessly effect the desired result. This newly-formed sinus can then be enlarged most readily by means of a crucial incision made by a heavy scalpel, and the root reached by means of a sharp cross-cut inverted cone bur. The remainder of the operation is similar to what has been above described.

Another method of producing an enlargement of the sinus, either if it be freshly made or an old tract, is to pack it solidly with a tent of cotton dipped in aromatic sulfuric acid, which should be allowed to remain there for twenty-four hours. This is by no means as desirable as immediate surgical interference, as it is not only productive of considerable pain to the patient, caused by the swelling of the tent, but the destructive effect of the aromatic sulfuric acid upon the soft tissues is very detrimental to a prompt closure of the wound.

In many cases of multi-rooted teeth, the amputation of the entire root affected by the disease is often to be preferred to the risk of leaving behind some necrosed tooth-substance. In such cases, the end of the stump can be nicely smoothed and hermetically closed with an amalgam filling, which at a later period should be polished as thoroughly as possible.

In pyorrhea alveolaris complex of all kinds, we meet with a large number of molars where the destruction of tissue has proceeded to such an extent that one of the roots has become entirely denuded clear to its end. This is especially true of the palatal roots of superior molars. In many such cases, the pyorrheal condition has for a long time been complicated with alveolar abscess. To remove the palatal root of such a tooth has become so frequent an occurrence with me that it is difficult to keep an accurate recollection of the cases, and it is consequently with a sense of deep gratification that I am enabled to report that I have yet to see the first case where the operation has not succeeded in permanently tightening these very loose teeth.

After the roots of such teeth are filled, the removal of such a palatal root is wonderfully simple. The parts are all exposed, and it takes but a few revolutions of the bur to amputate close to the crown, filling the end of the stump with amalgam, and later polishing the same.

Summarizing the treatment of chronic alveolar abscess, the same course should be pursued in the canals of the teeth as in the acute stage,—at the first sitting, if possible,—simply for the purpose of hermetically sealing the interior of the tooth. The diseased tissue is then to be entirely eradicated by surgical interference through an opening in the gum over the root, and if this be effectively accomplished, the abscess is bound to be radically cured.

PREPARATION OF PULP-CAVITY AND CANALS.

BY J. FOSTER FLAGG, D.D.S., PHILADELPHIA, PA.

(Read before the New Jersey State Dental Society, August 1, 1895.)

MR. PRESIDENT AND MEMBERS OF THE NEW JERSEY STATE DENTAL SOCIETY: It is with no apology or hesitation that I come before you with this so-called hackneyed subject, for both my practice and my teachings, as incumbent of a chair of Dental Pathology and Therapeutics, are so at variance with ordinarily accepted views, that I earnestly desire for them that full ventilation and discussion which shall come of presentation to such a body as this, and with the natural hope that points which have seemed to me guides to a proper practice may either be shown to be fallacious, or may be proven as truths which shall in turn guide many others to the obtaining of more comfortable, more satisfactory, and more generally acceptable results in this most important department of operative dentistry.

Disavowing anything like minute discussion, I shall strive to present only such salient points as, by their very magnitude, shall lead to serious thought on such possibilities of difference, and to the working out, each for oneself, of such incidentals as shall be essential to the harmonizing of modified practice.

It must be agreed that pulp-cavity work necessitates the *entrance into* the pulp-cavity, and this must be effected through at least a partial devitalization of the pulp; if this has been the outcome of other than medicinal application, the methods of entrance are various from only two practical considerations: first, removal of filling, naturally presupposing such to exist, and entering pulp-cavity from cavity of decay, recognizing difficulties of canal work and endeavoring to overcome them; and second, ignoring all previous considerations, and operating with the recognition *only* of the pulp-cavity and canal requirements, making such entrance as shall eventuate in a "tap," with all its advantages both for present and future possible complications.

But if, on the contrary, such pulp-irritation exists as to demand its devitalization, there is probably no other application as yet more universally resorted to than some combination of arsenious oxid.

It is in connection with these that I have long combated *one* consideration which, from constant mention and frequent discussion, I hold to be yet almost universally regarded as of much importance, and this is the *length of duration* of the application.

The periods of from five hours to a day or two (twenty-four to forty-eight hours), and by some even a week, are *lengths of duration* of application which are spoken of as though they were alike productive of good results and *preventive of undesirable ones*.

For the former (good results) I have, for more than thirty years, advocated the continuance of arsenical applications until such had accomplished the desired result, regardless of any five hours or five days or five weeks or five months (if circumstances should require it), in the full faith that length of duration of application was a matter of *absolutely no importance*, and that in fully-formed teeth (and I presume no one would ever risk making an arsenical application in any others) no undesirable sequences would *ever* follow as the results of arsenical impress.

As proof of this I had, in years long gone by, ample opportunity for following the frequent applications of arsenic which in those days were made for the obtunding of sensitive dentine, and which, having devitalized the pulps, had been the means of quieting all trouble until, in process of time, these pulps had putresced and had induced peridental irritation from evolution of mephitic gas, *precisely as they would have done had they been devitalized in any other way.*

Following such hintings I was *obliged* to abandon all *time* considerations as associated with arsenical applications, and have thus been enabled to make all pulp-cavity work, dependent upon these, in complete consonance with my patients' or my own convenience.

In this wise I always prefer that weeks rather than hours shall be the length of duration of applications; and so it is that when serious pulp-trouble unfortunately antecedes arranged summerings or other long absences from home, applications can be made which will effectually preclude any probability of toothache during such times, and which will, most probably, bring the tooth, upon return of patient, in excellent condition for thorough and painless treatment in the doing of pulp-cavity and canal work.

Having thus spoken of these applications, I would urge, most emphatically, the need for great attention to considerations *which do exist;* these are the proper placing, the precluding of the slightest pressure, the maintenance of position, and the prevention of leakage.

It is the recognition of the vast importance of these that renders it needful that no useless distracting thought should be expended, and it is these that imperatively demand that every attribute of "coverings" should be known and utilized, that thus temporary stopping, zinc phosphate, and facing amalgam should each fill its niche in this regard as no other materials or devices can.

With these views it becomes not only undesirable, but culpable, that wax, cotton with sandarac or other gum varnishes, or even gutta-percha or any other than the three coverings mentioned should be used, as no others permit the secure and proper utilization of arsenical applications.

And now, supposing that complete devitalization has been effected, pulp-cavity work becomes a simple and usually easy matter, as nothing is indicated except the obliteration of the anatomical walls of the pulp-cavity; by this we have the mouths of the one, two, three, four, or more canals distinctly defined and the bulbous portion of the pulp removed, and now the trouble begins.

Again, my practice and teachings are so at variance with usual methods, and my experience is so in opposition to many unqualified assertions, that I am compelled to give much prominence in lectures to views for which I have only antagonism *for fear* that my own experience and deductions may not be reliable; and yet I am again compelled to say that the results, year after year, make me more firmly an advocate of the practice which I give the class for the good of its patients rather than that which I give it to enable its members to pass the boards.

To begin, it is regarded, I believe, as the matter of *first* importance that all the pulp-structure should be removed, and to this end scores of pages in our journals and days of discussion in our societies are given to the methods and instruments for the effecting of this purpose, all having in view the following of every canal to its apical end, and *some* asserting positively that they always attain this "all-important" result.

I think it will be conceded that, with my long practice, almost exclusively directed to the "treatment" of teeth, and with my experience as a clinician of dental therapeutics during a college career of thirty years, I have probably entered as many, if not more, canals than any other of our country; and that I have acceptable skill in this work has been pleasantly attested to by patients, students, and many fellow-practitioners.

I therefore offer, as a testimony which may be comforting to some who, like myself, are not so successful, the statement that I not infrequently meet with canals whose entire length I feel it equally imprudent and impossible to explore.

More than this, I am cognizant of roots, in goodly number, the canals of which I *know* cannot be followed with the teeth in the hand. How much less, then, would this be possible in the mouth? In fact, this is just the barrier which, in my opinion, prevents belief in any statement beyond respectable ability as associated with canal work.

It is in this connection that I desire to combat, to the utmost, the claims of thorough removal of pulp-tissue as a matter of *first* importance.

My *fundamental axiom* in relation to all dental work is, *never do anything which, if proven detrimental, cannot be remedied.*

This rule cannot *always* be followed, but these exceptions are so very rare and are so universally associated with extremely doubtful and serious cases that, for ordinary practice, it may be said to be such as may be followed just in proportion to the knowledge of the practitioner.

This is the turning point of value of practitioner to patient always. Just as the conservation of the pulp is the *test* of value of practitioner to patient in the treatment of dental caries, so is correct treatment the test of value in canal work, and it is the immense *possibilities* which obtain with even semi-vital teeth that give to this work its immense importance.

Therefore, as in a large proportion of canals it is comparatively easy to go to the very end, I regard, as the matter of *first* importance, *that the apical foramen shall not be passed, and, above all, not enlarged.*

That it shall not be passed with the probe is because secondary or scar tissue at the apex of every root which has lost its pulp is a necessary sequence, and every irritation of such tissue is disadvantageous and renders it increasedly susceptible to subsequent irritation and inflammation.

That it should not be enlarged is because just in proportion as this foramen is normally small,—even at its smallest,—so is it possible to make a good canal filling whether that filling be of gold or of inspissated or even merely fluid medicament; and, inversely, every enlargement of this orifice, no matter how trifling, in equally just proportion renders it less possible to make a perfect filling of long continuance.

I shall ignore the whole question of medicating through an *enlarged* foramen, as such practice could only be indulged in cases of abscess without fistula, and, in my opinion, in such cases would be eminently bad practice.

As a matter *second* in importance I should place the *non-perforation of the root.*

My experience has taught me that this unfortunate occurrence is most frequently a result of attempts at enlarging and following canals in the determined work of removing every particle of pulp-tissue; and I would ask which is preferable, that a portion of pulp-tissue remain or that a root be unperforated?

It is simply begging the question to say that the canal should be thoroughly cleansed and that the root should not be perforated; for in this work no one perforates intentionally, and is there one of us who has never perforated?

For myself I teach that it would be better to leave ninety and nine entire pulps rather than perforate the root of one tooth; for the ninety and nine could all be attended to if trouble came, but the perforation would be an unfortunate condition just in proportion to the value of the tooth, and could *never be other than unfortunate.*

As a matter of *third* importance, I should say that a portion of drill should not be broken off *and left in a canal.*

And here again it will not do to say that such care should be used as that a drill shall never break, for, from the most careless to the most careful, who ever expected a drill to break, when it broke? and who is there among us who has never broken off a drill in a canal?

If such an one there be, I would ask, Can he be one of much experience? Why, even those I teach, *and warn*, break them off, and they write me that they *think of me* while they are getting them out; and if in this work they unfortunately perforate, they keep on thinking of me, so thoughtfully, so tenderly!

But why should these broken drills be gotten out? This is a long story which must be shortly told. It is not that of themselves they would do any harm, but it is that, mechanically, they might, in time of possible need, preclude the utilizing of that most important factor in the combating of peridental irritation, *an open canal.*

Who has not experienced, scores of times, the giving of almost immediate relief to teeth so tender that it hurt even to look at them, and that seemed a foot, aye, three feet, longer than any other, so soon as the last portion of obstruction was removed from the canal? and how almost utterly ineffectual are efforts, frequently, until this has been accomplished?

But more than this, how painful and exhausting this work is *no one knows except those who have endured it.*

In the removal of canal fillings of gold, of amalgam, of chloro-percha, of wood, of cements, there is *hope*, as there is constant progress ; but when a broken drill is found, which could not be removed when the tooth was firm and work was not uncomfortable, then indeed "Who enters here leaves hope behind." In a word, it is for *this* that the broken drill should, if possible, be removed.

But, as I have said, a long, long story should here be told, for just here is the battle-ground between those who believe that if every particle of pulp-tissue is removed and the canal is filled with an impervious and indestructible material, no further trouble will ever come, and, as it is expressed, "the work is *thoroughly* done and will last for life," and those who have no faith at all in such belief, and who, on the contrary, hold it as much *more thorough* to try and fix things so that they will remain fixed, if, fortunately, no trouble comes, but that there will also be ample preparation for future relief in case exigencies demand it.

A tooth is proven to have defective enamel-formation ; dental caries is established ; the cavity is prepared and filled ; recurrence of decay occurs ; the cavity is again prepared and is refilled ; the pulp becomes irritated ; the filling is removed, the pulp soothed and properly protected and a third filling introduced ; pulp-irritation continues in sufficient degree to eventuate in devitalization or to compel the employment of devitalizing agencies ; the dead pulp is thoroughly removed, and its place supplied with impervious and indestructible material.

Could less than several pages fully describe the great change from normal which now appertains to that tooth ?

Is it *reasonable* to assume that the remaining tissues of such a tooth are not only not weak and liable to give trouble, *each in its way*, but that they are so strong as to be able to maintain endless integrity even in this half-vital condition of the organ ?

Is it not true that secondary tissue, with its natural weakness, occupies the space which was formerly occupied by the vessels and their surroundings which entered the apical foramen and nourished the pulp ?

Is it safe to assume that having positively removed all possibility of peridental irritation from *one* cause, putrescence of the pulp, the other sixteen or eighteen causes will never demonstrate their power for harm ?

The followings which I have had in hundreds of cases, and the followings which others have had in many thousands of cases, have already, I am glad to say, established widespread doubt as to the truth of such assumptions and as to the safety of such reliance.

And now, as a matter *fourth* in importance, I should give *the removal of every possible portion of pulp-tissue.*

No one will deny that just in proportion as this is done, so it is reasonable to expect success ; but it is because cases of absolutely thorough removal of pulp are by no means exempt from early subsequent trouble, while plenty of cases of but very partial removal of pulp have given successes of remarkable duration, that the assigning to this work the position of first importance is regarded as entirely unwarrantable.

And I also hold that because of the possibility of doing much with antiseptics to preclude any likelihood of putrescence of remaining portions of pulp, and of the ease with which arrangements for venting and future purifying of pulp-cavity and canals can be made, it is equally unwarrantable to take any risk which could, by any possibility, eventuate in irremediable injury, for the purpose of accomplishing so comparatively unimportant a result as is absolute pulp-extirpation.

Viewing this work of canal entrance and cleansing as very important, I desire to refer to the suggestion of Dr. J. R. Callahan, as presented in his paper of July, 1894, in which he advocated the opening up of canals by means of "fifty per cent. aqueous solution of sulfuric acid."

After a year's experience of this method I can speak of it in terms of unqualified approval, and say that I regard it as *the* step in advance, in connection with canal work, which has been given us during the past twenty-five years.

Not only in fine, tortuous, and ordinarily inaccessible canals does this process make easy much that would be both difficult and dangerous, but it affords the most prompt, the most efficacious, and the most satisfactory method of entering, cleansing, and beautifully preparing the largest and most accessible canals.

I would call attention to his "pumping motion" of using the probes, both small and great, as a decided improvement over the dangerous rotation and twisting motion by which alone drills or broaches can be made available, for by this modification the danger of breaking off probes in canals is almost entirely abrogated.

I have found that there is yet danger of this if steel probes are used, as these in time become corroded by the dilute acid. I also found that electro-plated probes soon lost their gold, but with iridium-platinum and platinum-gold wire probes I have had an immense amount of comfort in doing and demonstrating this kind of work, for which I would tender Dr. Callahan the most hearty thanks.

And "now my story is done." The work which dentistry has to do after pulp-cavities and canals are prepared, eventuates in such varied and diverse practice as would require a paper longer than this for its discussion; but that which I desire to leave with you now, for your kind and thoughtful consideration, is the view that other things than the thorough extirpation of pulp-tissue are of infinitely more importance; that in the efforts to accomplish this comparatively unimportant result, frequent irreparable injuries are inflicted; that the whole idea that any work, no matter how thoroughly or perfectly done *inside the tooth*, will preclude the possibility of future trouble is fallacious, and for the good of semi-vital teeth should so be taught; that it should be recognized that *all* the other numerous causes of periodontitis, besides putrescence of the pulp, are more likely to produce that trouble with semi-vital than with wholly vital teeth; and that in recognition of all this, pulp-cavity and canal work should be such as would permit of future reparation if there be deficiencies, and of prompt and easy relief in the event of future periodontitis.

THE TREATMENT OF TEETH AND ROOTS PREPARATORY FOR CROWNING.

BY J. W. HECKLER, D.D.S., BUFFALO, N. Y.

(Read before the Eighth District Dental Society, State of New York, December 31, 1895.)

MR. PRESIDENT AND GENTLEMEN : As the subject of this paper is more or less a hobby of every dentist, I hope its discussion will elicit some new points in relation to individual methods of treating the class of cases I shall present here to-night.

I have had some charts prepared for illustrating the subject of this paper, which, I trust, may be the means of making myself more clearly understood. I have also divided the cases to be treated into classes.

First. We will take up teeth to be devitalized, which are shown in Fig. 1. I claim that ninety per cent. of teeth to be used for abutments in bridging should be devitalized.

My reasons for this are as follows :

First. It saves the patient an immense amount of pain in grinding the end and sides down.

Second. Often the pulp receives enough shock and irritation to produce congestion sufficient to stop circulation. Then death of the pulp is the final result.

Third. It is almost out of the question to grind a living tooth to the desired shape. When grinding down a living tooth, we grind to the extent the patient permits, *not* always as we want it. Hence my recommendation to devitalize for anchorage in bridge-work.

The operation of devitalization can be done in an almost painless way by drilling only through the enamel-wall, making the application of arsenious acid next to the dentine, and sealing it over with wax. I do this by placing a small bit of wax in the cavity and over the arsenious acid, heating a blunt instrument and thrusting it into the wax, when it will be melted and adhere to the walls, and hermetically seal it in place. (Fig. 2.)

I leave this application in from one to three days to suit the convenience of myself and patient, when it will be found that the pulp-chamber can be opened with very little or no pain to the patient.

After the first application of arsenious acid, the operator is enabled to grind the tooth to any extent he may desire to fit the band for the crown, when he can take the impression of the case and go on making the crown while the roots are getting into proper condition for filling.

Often this one application is found ample for the destruction of the pulp ; but if, according to the operator's judgment, it is not, make the second application directly to the pulp, and seal it over as in the first instance, and leave as long as your judgment dictates,—say from twelve to twenty-four hours,—when I am quite sure the pulp can be removed without pain.

After the thorough removal of the pulp and fragments comes the medicinal treatment. For such treatment I recommend washing out the chamber and canals with absolute alcohol ; this accomplishes two very important things.

First. It washes out the remaining fragments and blood-clots, and tends to act as an astringent, stopping the oozing of blood-serum from the foramen.

Second. Alcohol, having a great affinity for water, absorbs the water in the canals, and by evaporating it leaves the walls in a perfectly dry condition, a condition desired by those who believe in immediate root-filling, but in a condition I desire for further treatment. For this I recommend and use nothing but the essential oils, such as the oil of cassia, eucalyptus, etc., probably more of the cassia on account of its pleasant taste and odor as compared with the others, except in cases of front teeth, when I desire to retain the original color. The oil of cassia is liable to discolor slightly. I make this dressing by saturating a shred of cotton with the oil and carrying it to the bottom of the canal with a smooth broach.

It might be well to tell how to make a perfectly smooth broach, one that will not pull the cotton out after it is carried to place, as I deem it important that the dressing should be packed against the apex.

FIG. 1.

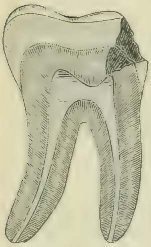


FIG. 2.

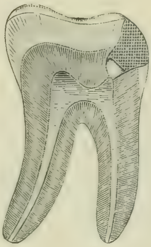


FIG. 3.

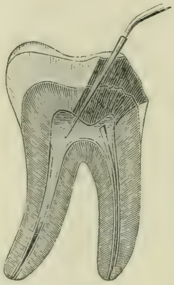
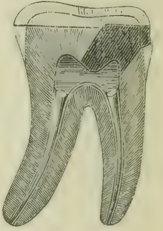


FIG. 4.



I take an old Donaldson broach or piece of piano-wire the desired length, put two sand-paper disks, grit side together, in the mandrel, and place the broach between them, and grind it to as fine a point as I like, finishing with cuttle-fish disks.

Getting back to the subject again. This dressing I leave in from twelve to twenty-four hours, and even longer. At the next engagement I invariably fill the roots, deeming further treatment unnecessary. On this occasion it is highly essential to adjust the rubber-dam, especially for filling the roots of the inferior teeth. After the dam has been adjusted so as to keep out all saliva, then—and not till then—remove the dressing from the roots and wash again with alcohol, and evaporate it with hot air from the chip-blower, or, better yet, a hot-air syringe.

After the thorough evaporation of the alcohol, the roots should again be wiped out with essential oil, and forced by heated air into the body of the tooth. It has been proven by Dr. Harlan and others that the oil penetrates every portion of the tooth-structure save the enamel.

Stop for a moment to see what takes place when we remove the pulp from its bony abode with its numerous attachments. We have a great amount of tearing of tissues, as you know the odontoblasts form the skin of the pulp, and their wavy tails penetrate the dentine through the tubuli and anastomose very freely on the periphery.

This being a fact, it is readily seen that some of the odontoblasts are left clinging to the walls of the pulp-chamber and root-canals, while some of them are pulled out, as it were, by the roots. The question now arises, What is to be done with these odontoblasts that are left on the walls and the fibrilli in the tubuli?

The treatment is that which I have described. It extracts its watery portion and embalms the animal. Next, by bathing the walls with essential oil before pumping chloro-percha into the canal, it promotes capillary attraction and prevents the chloro-percha from hardening and rolling up and not adhering to the walls.

This being done, we are ready to insert the keystone,—the gutta-percha cone (Fig. 3). This I do by heating a blunt instrument of the required size, sticking it into the base of the cone (Fig. 3), and allowing it to cool and harden before pressing the cone home.

I force this cone in as far as possible, absorbing with bibulous paper the fluid portion that has been forced out by the cone, and soften that portion of the cone which remains above the mouth of the canal by hot air and force it into the root with a blunt instrument about the size of the opening. Then I take a bur of a fair size and bur off the surplus gutta-percha, leaving the root entirely corked up, as shown in Fig. 4.

Next we will consider teeth and roots with dead pulps. In these cases too much care cannot be used in handling. Nothing short of years of experience will enable the operator to thoroughly master them, as almost every case has to be treated differently, but there can be some general rules laid down by which we may be governed.

The first treatment should be the chiseling and burring away sufficiently to admit of perfect and free access to the root-canals. Sometimes we find it exceedingly difficult to gain entrance to these canals, but if you bore out a little at the mouth, you will cut through a small stricture, when entrance will be gained without further trouble.

On gaining an entrance, one should use only the finest Donaldson pulp-canal cleanser, as a large one would prove too much of a piston. Do not attempt to remove any of the putrescent pulp by wiping the canal with cotton on a broach, as nothing could be worse.

The operator can, by careful manipulation, pass down between the pulp and the walls of the canal.

After the pulp has been removed, I use a dressing of cotton, packed very loosely, saturated with a solution of bichlorid of mercury, 1–1000 or 1–1500, and leave this dressing in from twelve to twenty-four hours, unless a complication arises from some of the pulp being pushed through the apical foramen, when it will be necessary to remove all dressing to give free vent. Sometimes we have trouble from gases forming, also the accumulation of serum caused by the enlarged and congested capillaries, when it is necessary to apply counter-irritants.

In either of the above cases it might be well to pack the cotton so loosely that the canal acts only as a drainage-tube.

After the complications have been controlled, I find by experience two treatments to be ample.

For the first, use the cotton dressing saturated with bichlorid.

This drug destroys the life of the germs, and at the same time tends to render them inert matter. I know of only one objection to the use of bichlorid: it is a slight coagulant, but I believe this can be partly, if not wholly, overcome by the addition of acetic acid.

For the second, use the dressing of essential oil and fill the roots in the foregoing manner.

I would like to discourage the use of some drugs in the treatment of pathological cases, especially the use of carbolic acid or any of the escharotics after devitalization, pyrozone, or any drug that is an effervescent. Carbolic acid only coagulates the albuminous fragments left in the pulp-canals, and is something that should be avoided; if it is used as a germicide, it only coagulates his coat and probably keeps him in a dormant state until such time as the condition and surroundings are favorable, when he will again put forth new life and be as mischievous as ever; besides, it is extremely difficult to use carbolic acid without burning the patient's mouth more or less. Pyrozone or any drug that effervesces should not be used in a putrescent case or blind abscess.

Gases expand equally in all directions. By pumping an effervescent into a root-canal partially filled with a putrescent pulp, expansion takes place immediately, and some of the putrid matter is forced through the apical foramen by pressure of the piston used to insert the pyrozone.

If there should be a serous sac partially filled with pus on the end of the root, and should the operator pump a sufficient quantity through into this sac, he will cause the patient more pain than he is likely to get forgiveness for in this world.

CORRESPONDENCE.

To the Dental Profession:

The recent investigations of Dr. G. V. Black are of the most profound importance to us as dentists, both from the practical and the purely scientific point of view. The substantial accuracy of his work has recently been confirmed by Mr. Charles S. Tomes, who has made what I think must be regarded as the most scientifically complete series of analyses of dentine and enamel ever performed. Mr. Tomes detected several possible sources of error in Dr. Black's analyses, and so set himself to eliminate these. With the results of the work of these two eminent investigators now before us we have a basis, from the chemist's and the physicist's point of view, for an entire reconstruction of the opinions so long cherished as to the causes and conditions of caries of the teeth. The conclusions reached by Dr. Black are, if not in perfect harmony, at least perfectly consistent with the views held by Dr. Miller. It now only remains to add such evidence of structural differences or agreements with reference to rapidly decaying and slowly decaying teeth as may be furnished by the microscope. It may have escaped the notice of many to whom the results of Black's work came as a great surprise, that the position he now occupies is not substantially different from that which he took up in defence of a paper which I read before the First District Dental

Society of New York, in 1886. This paper was chiefly devoted to a critical examination of the Heitzmann theory of the structure of dentine and enamel, and the bearing of this theory upon the problems of decay of the teeth. I may be pardoned for quoting a few sentences from this paper, as showing that the results of recent investigations have not surprised the few of us who stood against the absurd theories of the Heitzmann school.

I said, among other things bearing upon these points, "The apparent increased or diminished liability of the teeth to decay during life must be very largely attributed to changes in environment, changes in the character of the secretions and fluids of the mouth, rather than to any inherent change in the enamel itself." And I might have said dentine as well as enamel. Again: "An increased proportion of organic matter in enamel, within certain limits, by no means necessarily implies increased liability to caries." Mr. Tomes has shown by his recent investigations that the dentine of those teeth which are most prone to caries may actually contain a *larger* percentage of lime-salts than those which are less liable to decay.

But perhaps the one particular result of Mr. Tomes's analyses which will come as the greatest surprise to a large part of the dental profession is that which demonstrates that *enamel has practically no organic matter*. Mr. Tomes shows that the two or three per cent. of organic matter which previous investigators have recorded is largely, probably entirely, water. What now becomes of the *enamel-fibers* and the *inflammation-corpuscles* of enamel which have figured so largely in the work of Heitzmann, Bödecker, and Abbott during the past fifteen years? *Exit*, let us hope forever.

Once more I quote from the recapitulation of my paper referred to:

"Seventh. The method of the development of enamel and the microscopic morphology of the fully-formed tissue precludes the possibility of the existence of enamel-fibers in the sense taught by Drs. Heitzmann, Bödecker, and Abbott.

"Eighth. The demonstrations upon which the foregoing propositions are based, and the evidences furnished by careful microscopic study of caries of dentine and enamel, lead to the conclusion that the so-called inflammatory theory of decay has grown out of errors of interpretation, *and is without foundation in fact*." Ten years is a considerable time to wait for a complete justification. But many have waited much longer. Although "the mills of the gods grind slowly," etc., and it would not now require more than the faintest zephyr to blow away the little dust that remains of the inflammatory theory of decay of the teeth.

With a view to making the evidences of the microscopic structure of teeth, which seem to vary widely in their liability to decay, as complete as is possible, I invite all who are interested in this subject to send me specimens to be used in making sections for illustrating the series of papers which I am now contributing to the DENTAL COSMOS.

No time, pains, or expense have been spared by me in making this investigation, which has been in progress simultaneously with Dr. Black's work and with the same end in view, although I had no knowledge of his work until I saw the announcement of its publication.

In asking, therefore, for the co-operation of those interested, I feel certain of a generous response.

I should like—

First. Specimens of partially decayed teeth from the mouths of children between twelve and sixteen years of age *where the teeth are supposed to be of inferior structure and are decaying rapidly.*

Second. Teeth from comparatively perfect dentures in the mouths of persons between thirty-five and fifty years of age.

Third. Specimens of abnormal teeth of every description.

Fourth. Fossil teeth of every description, including fishes, birds, reptiles, and mammals. These, I suppose, are more easily procured in America than in this country.

A single specimen of any of the above will be quite sufficient for my purpose, and a brief statement of the history of specimens of the first, second, and third classes should be sent. Moist or fresh specimens of the three first mentioned classes are preferred, and they should be placed, immediately after extraction, in a fluid composed of equal parts of glycerol and alcohol of the ordinary commercial strength, such as is used for spirit lamps. To this may be added, when convenient, a few grains of corrosive sublimate. Small vials, such as Wolrab's gold is sent out in, will furnish a convenient means of packing. A bit of cotton wool should be placed in the bottom of the vial, the specimen placed on this and more wool on the top, and the vial then filled with the fluid, securely corked and sealed with wax. The wooden cases in which the vials of Wolrab's gold are sent out will make the best packing-cases for sending, but any wooden box will come safely. All specimens used will be duly acknowledged in the papers in which they appear.

J. LEON WILLIAMS.

30 GEORGE STREET,
HANOVER SQUARE,
London, W., England.

◆

PROCEEDINGS OF SOCIETIES.

FIRST DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

THE First District Dental Society of the State of New York held a regular monthly meeting Tuesday evening, December 10, 1895, at the Academy of Medicine, No. 17 West Forty-third street; the president, Dr. John I. Hart, in the chair.

After the transaction of routine business, the essayist of the evening was introduced as follows:

The PRESIDENT. I take pleasure in introducing to you Professor William James Morton, who will address you on the subject of "Electric Medicamental Diffusion, or 'Cataphoresis,' and its Relation to Dental Surgery." We are all pleased to meet Professor Morton, and when I mention that his father assisted largely in the discovery of anesthesia, I know that he will be doubly welcome.

Professor MORTON. I need not say that it gives me great pleasure to be with you this evening. I thank the president for his reference to my father : the share which he had in the discovery of anesthesia was sufficient for him and for me.

I must make a word of explanation and of apology in regard to the subject. I did not volunteer to bring it before you, but I appear at the request of quite a large number of your members, and I ought to say at the beginning that I know almost nothing about dental surgery or the science and art of dentistry, so if I stumble among the terms I must ask your indulgence ; but so far as the application of electricity to dentine or any sensitive tissue is concerned, I am willing to be cross-questioned, and to stand by what I say, as the result of many years of experimentation and of a great interest in the applications of electricity in medicine, and in allaying human disease and suffering. Some one remarked that you never went so far as when you did not know where you were going, and that remark is applicable this evening. This is almost an unknown territory into which we shall go on an exploring expedition. Isolated facts have cropped up from time to time, men here and there (and they have been very few and scattered when you regard the thousands who are interested) have taken up this subject. I will present it to you in a broad and bird's-eye view, and not spend too much time on dry technique or technicality, but be as elementary as possible and talk in the language of A B C ; and in order to make everything clear, I have discarded the usual written paper, thinking your interest might be more retained and more prolonged, and that possibly you might extend the time devoted to the subject if I should talk to you rather than read a paper.

We will address ourselves directly to the work in hand. We will begin with a definition of the term "Cataphoresis." In this connection, let me refer to the title—"Electric Medicamental Diffusion." We are all more familiar with the term "Cataphoresis." There have been a great variety of terms invented to express special views of the facts. You hear of "electric osmosis," "anodal diffusion," "metallic electrolysis," "anaphoresis," "interstitial electrolysis," "electric transfer of particles and fluids," and "electric transportation." In place of those terms I have used the term "electric medicamental diffusion," or, if you like, simply "electric fluid diffusion." That expresses what we shall endeavor to convey to-night, namely, that electricity does diffuse fluids and substances throughout other fluids and substances, and, in our particular case, through soft or hard tissue, particularly the hard tissue known as dentine.

Now for a definition of "Cataphoresis," retaining the old-fashioned term all the time. Cataphoresis comes from the Greek words "cata," meaning downward, and "phóresis," from "phorein," meaning to bear, to travel, to tend or trend. Cataphoresis then means "traveling downward." But why downward? Because the old electricians had the idea that there was a positive potential which was upward and a negative potential which was downward, and if you take a battery and hang an iron spoon in it and have copper at the positive pole, and start your battery, copper would be deposited on the spoon ; and if you used silver instead of copper, according to the old electricians, it would travel downward from the positive to the negative, and plate the spoon. The term "Cataphoresis" was used later on to express the more special applications of the phenomena to tissue. Cataphoresis then is the flow of fluids from the positive to the negative pole. You quickly see that if those fluids contain things in solution that make them medicines, then the medicines flow down from the positive to the negative; and if you make the tissue or skin a positive pole, and some distant part the negative, and this medicine has a tendency to flow with the current, then those medicines will travel in that direction.

I want to say right here that the effect of a medicine placed at the positive pole only extends half-way. That is to be borne in mind. It does not extend all the way. If you apply to one side of the gums the negative pole, and to the other the positive pole, and the positive has cocain on it, the cocain effect will only reach half-way; the other half will rather be hypersensitive than anesthetized.

Cataphoresis is only one property of a continuous current. There are several properties of a current which are used in all the medical branches. These properties may be enumerated as light, heat, magnetism, electrolysis, and cataphoresis. Like a huntsman, you or I may make use of any one of these five arrows in the quiver to bring down certain game, or diseased conditions. As an incident of light, you have the electric light, merely a matter of friction; electric energy has escaped and goes out to do work, and it does that work against resistance, and in doing so there is a transformation of the electrical energy into the energy to which we give the name of light, heat, etc. Our resistance now under consideration is tissue, and in that tissue the work is done. We do not want to light tissue, nor heat it, but we do want electrolytic effects and cataphoric effects. Now, we want to turn to several experiments in these cases before we are clear as to what we want to do and can do in medicine. I think we can make this thing tolerably clear from a physical point of view. Many experiments which are very simple may be made in our own offices. For instance, we may ask ourselves what is osmosis, and then what is electric osmosis, and how the simple or chemical osmosis differs from electric osmosis or cataphoresis, and then, having arrived at what cataphoresis means physically, we can see what cataphoric medication means, and that is what we are after.

[Illustrating.] I will draw on the board what would indicate a glass vessel, with a porous septum of terra-cotta. In one compartment is a solution of sodium chlorid, and in the other is simply common water. There is no electricity about it; and if you leave it a few hours to itself, this will happen: against the force of gravity the fluid will rise in one compartment. The fluid of less density adds itself to the fluid of greater density. If you wish to recall in what direction the osmosis occurs, remember the motto: "To him that hath, it shall be given"; the right compartment is already richer in salts, and therefore the fluid of less density goes to it; but we can aid or can reverse that result by electricity. We fill both compartments to an equal level as before. We dip a platinum wire into this solution (of lesser density) and make it the positive pole, and we dip this wire into the other solution (of greater density) and make it the negative pole. What took twenty-four hours before to occur without electricity will now occur in a few minutes with electricity. You have immediate electric osmosis, instead of plain or simple osmosis or capillary attraction. That is the difference between the application of an ordinary substance and one that has electricity behind it. Reverse the position of the electrodes, and simple chemical osmosis is reversed.

Let us draw another glass vessel, and put into it another porous septum, and make this experiment: We will put into one compartment a weak solution of iodin and water, and make it a positive pole, and in the other a weak solution of starch-water, and you quickly see what reaction takes place. If you turn on a few milliamperes of current, you will soon see the beautiful blue color of the iodin compound of starch appearing outside the septum, and then you see streams of it going across to the negative pole and taking its position there. There you have the cataphoric flow taking with it iodin. Iodin has gone through the porous septum, and combined with the starch wherever it meets it. There is electric transfer and transportation, and movement of fluids and of medicine.

Perhaps you are willing to think that osmosis, then, has really something to do with this process. I will show you a simple experiment here which will demonstrate to you in a practical manner that this is possibly simply a mechanical movement of the current,—a mechanical force,—and that it is the current itself that moves these things along quite independent of any porous septum. Here I have a U-shaped glass tube, within which is sulfuric acid and water, and you must be careful how you make that solution; if you add to the water in the tube five drops of a ten per cent. solution, as in this case, you will get a good result. Some platinum wires dip into each end of it, and a little globule of mercury rests at the bottom. I will place that globule of mercury in the center, and I do not know which way it will move; but it will move from the positive pole, and go with the current from the positive to the negative end; and if my right hand is positive, then the globule of mercury should move from the positive to the negative. If you watch, you will see the movement of the globule. You see that it jumps away from the positive end of the tube. That is the mechanical force of the current, and osmosis has apparently nothing to do with it. That experiment suggested to me what I hope will be a very interesting way of determining the poles of the battery that you are using,—a pole-finder. I have invented, within a short time (and Mr. Wheeler and Mr. Evans made it up quickly for me), a little pole-finder. Sometimes, in the middle of an operation, I have my doubts as to what pole I have, for electricity is a very subtle and deceiving phenomenon. With one of these little things, when the current is on, you have only to touch it to the instrument to find out which pole you have, and it is very much cleaner and prettier than litmus paper or anything of that kind.

I will say that you may even drive solid particles into tissue, and solid particles will move through fluids by the aid of electricity. I have taken some salicylate of soda, and incorporated with that some finely-powdered lamp-black or graphite, held it on my arm, and driven it into the sweat-follicles so deeply that my arm was tattooed for some time. That shows that you cannot be too sure of your osmosis. Finally, I am sure no one here has any doubt that an electric current, particularly a galvanic one, has the property of driving with it things from the positive to the negative pole.

If you are sure of your foundation, you can accept very readily a great many other things which come later on. Now comes a question, best introduced here, of your apparatus and your appliance, of your outfit and your equipment. You may, according to your convenience, use a battery or some device for utilizing the street current. Your battery may be the ordinary red-acid cell, or preferably some form of the Leclanché cell. If you use cells, I think the Leclanché, 30 to 40, would be sufficient. If you use the street main, you must appeal to the different manufacturers to find out the best way of using it, and you will find among them a great diversity of opinion. I have been in the habit of using in my office a system devised by Mr. Vetter, where he uses a lamp and cuts down the voltage from 110 to 60, and then cuts that down by the aid of a rheostat. Here is the Vetter rheostat, with pulverized carbon, which is very simple. Here is another interesting rheostat, devised by Mr. Wheeler. The Electro-Therapeutic Company manufacture it. It is of advantage in dentistry, because you use remarkably small currents. In our medical applications we use from one to five hundred milliamperes ; and I may say that these terms of amperes, volts, and resistances are very simple. A volt is the pressure that is behind to do the work. An ampere is what you get out of it by reason of the pressure, and the resistance is the pressure you work against. A volt is therefore like water-pressure. A milliampere is not a quantity of electricity, but the rate at which electricity flows per second, and you can measure it per second, the same as if you let molasses flow for a second and get a quart ; this last measurement represents quantity, and is called a coulomb. We speak of milliamperes and amperes ; but in dental work you must speak of fractions of a milliampere. You are working in fractions of current, and you must have a machine that will work in fractions of current : five hundred milliamperes is half an ampere. In dentistry you use a tenth or twentieth of a milliampere, and if you get up to three or four milliamperes, it is quite high. You must use an instrument that will control small currents, and this is the only one I have thus far seen that will do so ; and you must use a milliamperemeter to record your "dosage," so to speak, of electricity.

Why must you use such small currents? That opens a very interesting question. One of the most sensitive reactional agencies to an electric current is what is known as the "frog's leg galvanoscope." It is a frog's leg in which the nerve is exposed. Touch a current to that, and you will get a jump at a very minute current strength. That nerve is a motor nerve. The nerve in the tooth is a sensory nerve, and is just as sensitive as that frog's leg, if not more so, and its reaction to stimulation is pain.

Nothing has struck me so much as the fact of the extraordinary sensitiveness of this nerve in the tooth. That brings me to a point where I can say a word about the battery current and the street current. I will not say anything about the street current being nicer and cleaner to use than the battery. I will simply refer to another point. If you insert a telephone into the circuit of the street current, you will hear a hum or buzz. That means that the current at the central station is not completely rectified into a continuous current. It is sufficiently rectified to do the work which is required of it, but is it sufficiently rectified to apply to a tooth? If you pulsate it or make and break it, then you know the response you get in the motor and sensory nerves. The street current is therefore a "varying" current, and that is why it gives pain. A battery current flows quietly without any pulsation, and it does not begin to give the pain that the street current gives. I only advance that idea for you to digest. It is an actual fact, and you can meet it as you please. I am satisfied that the street current will do practical work, and a man can get along with it extremely well, but my preference, from what I know now, would be for the battery current.

I know of no rheostat that can be regulated in dental practice except this one. It can be just as well arranged for a battery current as for a street current. What other appliances do you need? Almost nothing. We speak of two kinds of electrodes, an active electrode and an indifferent electrode. An active electrode may be of any shape,—an ebonite handle holding a platinum wire, a little absorbent cotton is twisted on the distal end of the wire, and whatever agent you wish to use for bleaching or obtunding sensibility, you use in that simple manner. The indifferent electrode is a matter of not so much difference after all, but the very best I have found is a piece of punk, fastened to a piece of carbon grooved on the edges, such as I have here. The advantage of it is there is no metal about it and it does not oxidize. The punk holds the water for a long time, and is always moist; it does not "burn," and is very soft to the skin. Punk is better than a sponge. You place this electrode wherever you please. It does not make much difference if you are treating the tooth with the positive pole where you put this negative one, on the sole of the foot, in the hand, or in the small of the back. What you want is the specific action at the positive pole.

I think we may now turn our attention to the therapeutics of the subject, which can best be divided into several branches, and then we may refer to the specific applications under their proper divisions. For the sake of simplicity and clearness I will divide therapeutical applications into (1) cataphoresis and (2) cataphoric medication. Cataphoric medication I will again divide into two divisions, one of them from (A) solutions, such as solutions of dioxid of hydrogen in water or ether, or aqueous solutions of cocain, and the other (B) from soluble electrodes.

Upon the table here I have a large number of electrodes made with copper and zinc, and some of iron and of silver, all of them oxidizable metals, and that is that branch of cataphoric medication which is medication from soluble electrodes. Cataphoric medication by solutions (A) comprises (a) the bleaching of teeth, (b) anesthetizing of dentine, (c) anesthetizing soft tissues. First, cataphoresis. We hardly need say anything more about that. We are quite familiar with those facts. When I hold a sponge in my left hand and another in my right, and a galvanic current passes through my system, the tissues are subjected to cataphoresis as well as to electrolysis, and the latter has as much or more to do with effects produced than electrolysis has, because it moves fluid say from nerve to muscle, from fiber to fiber, from cell to cell even, and a power like that must exercise a great influence upon tissue. I can illustrate it to you in a very easy manner in this way: if you put your positive piece of wire into the ball of clay here [illustrating], and put a negative pole platinum wire into some other part of the ball and turn on your current, soon the water will begin to roll out of the clay at the negative electrode. How did the water get there? Obviously by cataphoresis. Humorously you may say, if you went exploring and found a clay bank, and wanted to get water, put your negative pole into the bank and your positive elsewhere in it and you will get the water. The same thing is true with this piece of meat.

Now, what is cataphoric medication? That has been largely answered. With the fluids that move go the medicines. Those medicines may be solutions, and that is cataphoric medication from solutions. At this point we are enabled to touch the two branches, one the obtunding or anesthetizing of sensitive dentine, the other the bleaching of teeth. I have not referred to any of the general cases in which I use cataphoric medication in medicine, nor will time permit me to do so, but there is one application I shall not omit, because it has a very important bearing on the work before us, and that is to produce local anesthesia, an electro-cocain local anesthesia.

Since 1890 I have demonstrated what I claim to be practical local anesthesia of the skin or mucous membranes. It is produced by a watery solution of cocain, ten or twenty per cent., even four per cent. will act. That solution is placed upon an electrode and placed upon the skin with the positive electric pole on the skin and the indifferent electrode wherever you wish, and in a few minutes the skin is absolutely numb. I have anesthetized the thumb for the incision of a felon, and used the method in many other cases. All this time I was using simply a cocain solution, and there were certain objections. There was much technique about it: you must wash the skin to get the oil out of it; you must bring the metal part close to the skin and then put a porous septum like blotting-paper between the electrode and the skin. In the use of an applicator the metal must be brought close to the tissue. This question of nearness of the metal or carbon meant much. The mistake of having it comparatively far away was made by many experimentalists who used sponges. This cocain anesthesia that I used for a number of years has never seemed to attract much attention. Every one is more interested in some hypodermatic method, and people seem to neglect the thing right under their faces, which is electro-cocain anesthesia.

A few weeks ago, I made some experiments with guaiacol (before I had any thought of appearing before you) for producing local anesthesia electrically. I made over one hundred experiments, and I was determined to find something that would enable me to use it. Guaiacol is one of the phenols. It is an extract from creasote, which you know is one of the violent escharotics, and produces intense dermatitis. I rubbed the cork of the bottle containing creasote on my arm and on Mr. Evans's arm, not knowing how violent it would be, and I have still a sore spot on my arm, and I presume he has too. Guaiacol, however, is almost absolutely bland. It is creasote freed from its irritating hydroxyl. It can be used without producing pain. I use guaiacol alone or eight per cent. cocain with guaiacol, and then I have the most beautiful local anesthetic effect I have ever seen. I have demonstrated its action before my post-graduate class, and have performed minor surgical operations without causing any pain. There was a great advance on electric cocain anesthesia with aqueous solutions. That same advance I will leave to you as a novel feature of obtunding the sensitiveness of dentine to-night, and refer to it again later on. Pursuing our line of inquiry of cataphoric medication by or from solutions, we are led, as has been said, to two subjects,—one tooth-bleaching, the other tooth-benumbing.

As to the bleaching, I am not very familiar as to what it is that causes the stain in a tooth. I am told that it would be important to remove that stain, if possible, from certain teeth. That is a clinical and physical experiment, and I allude to it here in its physical aspect. I do not wish to be dogmatic, except so far as the electric part is concerned. This discoloration I believe is due to an organic product resulting from the decay of the nerve and some of the softer parts in the inside of the tooth. Being organic, it is acted upon by dioxid of hydrogen in such a way that its organic integrity is disturbed, and it loses its color. That experiment can be made outside of the tooth, as we all know. There is no more beautiful bleaching agent than dioxid of hydrogen. I wanted to know if cataphoric medication could be useful in bleaching. The bleaching of teeth was suggested to several gentlemen by Mr. William J. Evans, of McKesson & Robbins, and several gentlemen made reports on that subject, and I believe in the DENTAL COSMOS and in the *International Dental Journal* Dr. Kirk and one or two other gentlemen wrote on the subject, but otherwise comparatively little work has been done in that regard. A hippopotamus's tooth was taken (which I have here) and bleached cataphorically, and you will see, although it does not show so well at night, that the part bleached electrically is bleached whiter and deeper by far than the part treated topically and without electricity. It is well known that the dioxid of hydrogen, or pyrozone, applied to a tooth topically, will produce a bleaching effect. To produce the effect cataphorically, it must, of course, come against some part of the tooth that is a conductor, and that is the dentine; so there should be a cavity in the tooth that is to be bleached, and, if there is, absorbent cotton containing a twenty per cent. solution of dioxid of hydrogen is applied there and the current turned on. The first effect is that the electricity will carry the bleaching agency at once down to the end of the root. The canal must therefore be sealed up, otherwise most of the dioxid of hydrogen will be carried down to the root-ends, and the bleaching will all be where you do not want it. Here is a tooth sawed in half, one-half of which is bleached with cataphoric medication, and the other part has not been touched. The tooth may be sunk in blotting-paper saturated with sulfid of soda to make the experiment outside the mouth, and the cotton on the applicator may be frequently wet with the soda salt. If pyrozone in various solutions will bleach without the current, it will bleach better with the current. In the case of osmosis that I illustrated to you, you saw that without the current it would take twenty-four hours, but with the current it would take only a few minutes, so the electricity is a great saver of time.

Knowing these things, I published, some months ago, in the DENTAL COSMOS some experiments which I will briefly narrate here. They were teeth sunk in clay and blotting-paper, and acted upon by a twenty-five per cent. ethereal solution of pyrozone. Recently I found a very important thing in tooth-bleaching, and that was that you may make a twenty-five per cent. aqueous solution of pyrozone very easily. Just before we were called to order to-night, Mr. Evans made this aqueous solution. I will show you the great advantages of that solution in a moment. Take a glass tube and two cubic centimeters of pyrozone, twenty-five per cent. solution, and add to it a cubic centimeter of water. Mix it in the tube and put it into the evaporating dish in a warm place, and in three or four minutes the ether is entirely evaporated, and you have left an active watery solution of pyrozone made very quickly. Otherwise you could not get such a strong aqueous solution. It does not retain its qualities any great time, as the oxygen escapes. But why an aqueous solution? That is one of the important points. If the resistance of the fluid or medicine that is to be driven in cataphorically is too great, no current passes; if it is too small, there is no cataphoresis. We want a certain degree of resistance to get a certain effect. An ethereal solution twenty-five per cent. pyrozone is a bad conductor. We dip the applicator into a solution of sodium chlorid or phosphate of soda and dip it into the twenty-five per cent. solution, and then we have a liquid electrode, and you can electrically get the pyrozone into the tooth where otherwise you could not; but this aqueous solution is much better. In itself it is a non-conductor. Distilled water, of course, will not conduct current, but, being an aqueous solution, you can dissolve in it other substances which make it a conductor of current. You have a difference in this respect: that with an ethereal solution you cannot dissolve anything that will make it a conductor, and with the watery solution you can. I am only speaking, of course, of what may be done. I offer the strong aqueous solution as a great advance on the ethereal solution for cataphoric application, and as an opportunity of getting rid of this clumsy process of covering your applicator with cotton saturated with some foreign substance like sodium chlorid or phosphate of sodium. You need not use pyrozone to bleach teeth. If you dip the cotton into sodium chlorid, the chlorin would be set free, and you could use that; but there are reasons why chlorin has a destructive effect on the tissues of the teeth, and there are reasons why the pyrozone is much safer and more preferable to use. What would be the actual experiment and how would you do it? You would have your street current with this rheostat or your battery with this other rheostat, and here is the little applicator. You take an aqueous solution of pyrozone, twenty-five per cent., and add to it a little phosphate of soda to make it a good conductor, and then apply it to the point you wish to bleach, and then you or some one else will turn on the current very gently, and long before any needle or milliampere needle that I now possess would indicate any current, the patient would say, "I feel the current and it gives pain." So it does at first, but by leaving the current where it is the pain dies away, the current may be increased, and the application can be continued in that manner. You would not use more than half a milliampere, or possibly a milliampere of current, and that would drive the pyrozone into the dentine of a tooth if the enamel is broken at any spot.

We may leave tooth-bleaching at this point. I will take this opportunity of calling your attention to two or three beautiful experiments that are illustrated here, one of them particularly relating to the bleaching of teeth. Here are two pieces of blotting-paper tacked on to this cardboard. On the right-hand piece was placed pyrozone, three per cent. solution, and on the other a solution of potassium iodid and starch, and the reaction is to set free the iodin. You see the discoloration of the iodin that has been set free very beautifully. The electric current was applied, the positive pole at this point and the negative pole here. [Illustrating.] These very experiments drove the potassium iodid just half way and only half way. You cannot get the effect of any medicine all the way from a positive to a negative pole. Its effect will go just about half way, measuring by resistance. This was a deficiency in the electro-cocain electrode made by Dr. Westlake for producing anesthesia in extracting teeth. One of the cups was placed on one side of the tooth and the other on the other side ; cocain was placed in the cups on a sponge. One side was made positive and the other negative, and it was expected that the cocain would be driven through from one side to the other, and make the gums, all the way across, so numb that the tooth could be drawn without pain, but that is impossible. One side would be numb and the other would not, and the patient would experience pain. It would be impossible with this apparatus to pull a tooth without pain.

Apropos of that, and while we are speaking of the subject, here is an instrument devised by me which will do the work in a different manner. The metal plates are bored with holes, so it will hold the solution, and there is a little reservoir behind each plate. It resembles a pair of tongs, and both blades are made positive poles and the negative pole is held in the hand. Both sides of the gums must become numb by this method, and therefore the tooth may be pulled without pain. For tooth-extraction then it must be used in this way. But to successfully extract a tooth painlessly by electro-cocain anesthesia I have found it necessary, if the pulp is not dead, to go still further and benumb the contents of the pulp-cavity by applying the same solution electrically to absorbent cotton placed in a cavity in the tooth.

Here is another experiment. On each of two pieces of cardboard are placed, side by side, two pieces of blotting-paper. On one piece was put, on a glass plate, dioxid of hydrogen (a twenty-five per cent. solution of pyrozone), with sulfate of soda to make it conducting. On its contiguous piece, in contact with it, was placed a solution of permanganate of potash. The second cardboard represents the same experiment done without electricity. As you look at the two cardboards you will see that where no electricity was used the dioxid of hydrogen got across about one-sixteenth of an inch, and during the same time where electricity was used the dioxid of hydrogen got nearly half way across and bleached its opposite piece of blotting-paper as white as wool.

Supposing the medicine you wish to drive in is not a bleaching substance, but something else. Suppose you desire to employ cocain on the dentine, to make it insensible to pain. You would be doing what Dr. Gillett, of Newport, has called our attention to. It stands to reason that if, in general, medicines will go into the tissue by the aid of electricity, cocain or any other anesthetic will do so if that tissue will conduct current. The question that occurs to every man is, Why not use chloroform or sulfuric ether? Simply because they will not conduct current. That ends them, unless some one finds a way to make them conduct. If you drive them in they set up a great inflammation. Cocain may be driven in, but in order to do it (I need only say a few words, having already spoken too long on the subject) there must be a cavity which will allow the instrument to go in, so it can affect the sensitive dentine. If you take a cocain solution, a watery solution of twenty per cent. (although I never work with such a high solution, using ten per cent. usually), and place it on absorbent cotton within the tooth which is sensitive, and then turn on the current with this rheostat very gradually, in a certain number of minutes, varying from five to seven, and running up to twenty or thirty, the dentine becomes entirely numb and does not exhibit the slightest sensation upon the use of any excavator in the hands of the most skillful or unskillful men. The technique involved is as simple as that in bleaching.

Electro-Guaiacol-Cocain Anesthesia.

Passing from cocain anesthesia, it occurred to me, in regard to dentine as well as in regard to the soft tissues, that guaiacol might be brought into play as an improvement on electro-cocain anesthesia, and for that reason I tried it on the sensitive dentine. I have here a number of small bottles of guaiacocain which are at the disposal of any one who would like to make application of guaiacol-cocain anesthesia. This solution consists of one dram of guaiacol and six grains of anhydrous hydrochlorate of cocain. I find that it is far superior to an aqueous solution of cocain. Two experiments were made in my office, Dr. Rhein very kindly bringing down two cases of sensitive dentine in a young lady. The cases are as follows:

Experiments, Dec. 3, 1895. Patient Miss M. W., aged eighteen, brought to office by Dr. M. L. Rhein, and operations on the teeth by him.

Teeth of extremest hyperesthetic state.

Experiment 1.—Deep crown cavity in second superior right molar, almost to the horns of the pulp of the buccal root. Very sensitive, especially as it approached the horn of the pulp.

Electro-guaiacol-cocain anesthesia; seven minutes in two applications. Result, perfect anesthesia to hand excavation. Patient experienced no pain from the current.

Experiment 2.—First right superior bicuspid, posterior approximal and crown cavity. Had attempted to prepare the tooth at a previous sitting, but on account of the extreme sensitiveness work had been abandoned before the cavity had been entirely excavated; the bottom of the cavity was covered with asbestos paper, over which was packed a filling of gutta-percha. On removal of the filling, after having been in place about six weeks, it was found exquisitely sensitive to the slightest touch.

Electro-guaiacol-cocain anesthesia. The first approaches of the current (not noted on the milliamperemeter) gave severe pain, which gradually subsided, and each subsequent increase of current caused pain. Three applications on cotton were made. After seven minutes of about one-tenth of one milliampere, I was able to carry the current up to two-thirds of a milliampere without pain. Complete anesthesia.

On exploration it was found that after the removal of a thin film of leathery dentine, the point of an excavator readily entered into the pulp-chamber without any consciousness of pain on the part of the patient. Completely successful.

No hyperesthesia of the tooth the next day.

In my experiments upon soft tissues, as well as upon dentine, I find that guaiacol to which cocain is added enables me to reduce the time ordinarily required to produce anesthesia about two-thirds, and, what is still more important, enables me to reduce the current strength of electricity required also two-thirds. The important feature of guaiacol in soft tissue is that it holds on chemically to the cocain and thus prevents quick absorption into the general circulation and consequent toxic effects. To prove this assertion take a ten per cent. solution of hydrochlorate of cocain and shake it for a considerable time with an equal bulk of water. One-eighth of the cocain only will be found to have gone to the water, and seven-eighths to have remained with the guaiacol. This is a very remarkable fact, and it bids fair to open the way to the adoption of electro-guaiacol-cocain anesthesia as in reality a practicable and useful procedure in minor surgery, since aqueous solutions on large electrodes might allow of too much absorption.

In Experiment 2 you will note that a live pulp was anesthetized. It will readily occur to you that other drugs besides cocain may be electrically introduced by way of the pulp-cavity, and that you may thus treat not only dentine but also the pulp itself, and even soft and hard tissues at, and surrounding, the apex of the tooth. When you put any solution of cocain into a tooth, its effect may be quickly exhausted ; that is to say, the thin layer next the dentine is exhausted of its properties by the electricity and by the cataphoresis. It is quite important from time to time to renew the application. After two or three minutes I take out the cotton and put on some more of the substance, and do that two or three times to be sure that the fresh anesthetic is against the dentine. I was very much amused during the progress of the two experiments detailed because Dr. Rhein was very skeptical, and was determined to hurt this patient, and I was afraid for a while he would, but he did not. He will speak for himself later on.

I have called your attention to the aqueous solution of twenty-five per cent. pyrozone for bleaching by electricity as something entirely new, although prior experiments have been made with twenty-five per cent. ethereal solutions. Phosphate of soda should be put with the aqueous solution as a conductor. I have used guaiacol alone in soft tissues, and it makes quite a numb spot. To use it alone you turn out a dram of guaiacol and try to conduct current through it, and it will not conduct ; but it has this peculiar property, that it absorbs one two-hundredth part of water, and water will conduct. I add one drop of sulfuric acid, which makes a dilute sulfuric acid. If you give the mixture a quick shake you have an emulsion of water, sulfuric acid, and guaiacol, and you have a good conductor ; and as soon as you use it in that way, with one drop of sulfuric acid and one two-hundredth part of water, you can get guaiacol local anesthesia, which is again entirely new.

For any one who wishes to try two new preparations I will give these two recipes, the one I mentioned above and the guaiacol as I just described it, with water and sulfuric acid :

℞—Guaiacol, ʒi ;
Cocain hydrochlorat anhydrous, gr. vi. M.

℞—Guaiacol, ʒi ;
Acidi sulfurici, ♏i ;
Aquæ dest., ♏ii. M.
Sig.—Make emulsion.

In the second way you get mainly a guaiacol anesthesia. That will make a local anesthesia which may be used in obtunding sensitive dentine. I have used it on the skin, and very successfully, too. What the effect on the dentine would be I do not know. Possibly some of you gentlemen would have an objection to the one drop of sulfuric acid ; I do not know.

You remember I said you could produce cataphoric medication not only from solutions, but also from soluble electrodes, that is to say from metals, and this latter I think is one of the most interesting branches in regard to the application of electricity in medicine, and it may be of great use in dental and oral surgery. That is of course for you to decide. Take, for instance, your galvanic battery and make an experiment in this way. Take a piece of butcher's meat like this, and a copper needle, making it a positive pole, and put it through the meat, positive copper needle here, and the negative needle of any metal anywhere else ; then the copper is dissolved, and you have made out of the tissue of the meat some oxygen and chlorin, and those combined with the copper make oxychlorid of copper ; and this salt is not only thus locally manufactured, but it is also driven into the tissue from the deposit around the needle. On section of the piece of meat you see the beautiful green stain that has permeated in a considerable direction from this copper electrode. In order to make that more clear I took the white of an egg, and you can see a green stain running across the white of the egg. That green stain shows where a small copper needle went through the white of the egg. It is stained, and the yolk of the egg is also stained the same green color. There has been a diffusion throughout the tissue of oxychlorid of copper, which is a salt that possesses certain definite action upon tissue. In general medicine I have made use of these copper electrodes in a great variety of applications. I will not weary you with an account of them. Here are electrodes with bulbs of copper, zinc, and zinc amalgamated, of silver, iron, etc., all of which screw on to handles, and can be used in various medical operations. Here are corresponding needles of all sizes. Here is a bulb of copper which can be passed into the throat in pharyngitis, etc. Here is one which may be passed along the urethra in cases of acute or chronic gonorrhea. This one may be used in diseases like certain forms of cancer, in the sinuses, and in a great variety of cases in general medicine and surgery. This method has not yet been used in general medicine. It will come in time. It is very interesting to have it applied to dentistry. Many applications would suggest themselves to you. With zinc you could use an instrument and pass it to a certain spot, and with the escharotic and destroying salt produced you could secure certain results. With copper less active salts are produced. I would not like to suggest what applications might be made. I think you will make your own suggestions, but it occurred to me for instance to suggest the use of it in a case of pyorrhea alveolaris. Dr. Rhein brought such a case to me, and we made a copper spatula and passed it into the gully that existed, and passed into that tissue the oxychlorid of copper, staining the tissue green. You could have done it with zinc, but that would be probably too destructive. The question is, what result is set up by that action? As far as I know, in many cases the results have been very fine. I have recently cured a case of extensive lupus, which had eaten into an extensive area of the cheek, and by using this it has almost entirely disappeared. With a zinc salt you would get a chlorid of zinc, and if it were necessary to bore through the alveolar process you might do so, and with an exposed tip pass in the instrument, turn on the current, and dissolve as much oxychlorid of zinc as you please at that spot. It might be one of the best ways, because if you put chlorid of zinc on a tissue topically it does not get driven in. It is an application or wash, and remains superficially situated. That is where this cataphoric application comes in. To use a homely comparison, the topical applications might be compared to a nail put on a board; but if you take a hammer and drive the nail in, that is cataphoresis.

I am very much obliged for your kind attention.

Discussion.

Dr. H. W. GILLETT, of Newport. It has been a matter of great interest to me to hear what Dr. Morton has said. I must congratulate you all that you have had the opportunity to hear him. I only wish I might have heard and known a year ago what I have heard Dr. Morton say to-night. It would have saved me many hours of labor. It has been a great pleasure to me to hear Dr. Morton refer to my efforts in complimentary terms, and I especially value his indorsement of the apparatus for the origination of which I consider myself responsible. Any credit for the mechanical details and the final working out of the principle belongs to Mr. Wheeler and the Electro-Therapeutic Company. If I could say to you how much relief this principle of cataphoresis or electrical diffusion has been to me and to my patients in the last eight months, I think you would all want to begin its use to-morrow. It has taken a burden from me. I think all of you have the experience of making appointments with patients, and dreading those appointments until they are over. You know that half hour, or hour, will be a severe strain for you and for the patient. Those cases I have ceased to dread. I make appointments for those patients, and have done so since April, when I reduced this method to every-day practice, with the assurance that I can do the work as well as I did before, without hurting them. I do not now go through that strain and worry in preparing sensitive cavities.

There is very little in what Dr. Morton has said that I would presume to criticise in any way. There are one or two points to which I would take some slight exception. While he may be quite correct in what he says as to the choice between a battery system and the continuous-current system (or, as it is commonly called, the Edison system), I do not feel convinced by the evidence he presents. I do not at the present moment know of any reason that would induce me to change from the use of the Edison system to a system where I depended upon batteries. I find no difficulty whatever from the slight vibration that Dr. Morton speaks of. The only difficulty I find from the Edison current is the occasional irregularity due evidently to some imperfection in the machinery. The slipping of a belt for an instant, of something of that kind, will make a little bit of a jump; but it has not happened in three cases in the last six or eight months, and so little annoyance as that, compared with the trouble of caring for a battery, unless you have a sufficiently skilled assistant in your office, is not to be considered.

I was interested in what Dr. Morton said about guaiacol, because I was on the track of that myself. I was disappointed because he did not report better results, because I can duplicate those results with cocain solutions. If I understood him correctly, I think I can do even better with cocain. With regard to guaiacol, there are certain reasons why I have hesitated to experiment with it. Its odor is very disagreeable (exactly that of creasote), and I also feared lest I might stain the tooth with the guaiacol itself. Possibly Dr. Morton or Dr. Rhein can settle that point for us, and enable us to go on with more confidence. One little practical point that comes to me now is that I find it more convenient to place the cotton in the cavity and apply the electrode to the cotton, than to wind the cotton on the electrode, because you can keep the cocain solution just where you want it much better by fitting the pellet of cotton in that way than you can by winding it on the platinum wire, and thus having a somewhat hard ball of cotton. While we are speaking of the cotton, I could not quite see what advantage Dr. Morton got from turning off his current and changing the cotton. Why not take up a drop or two of the solution in his pliers by capillary attraction, and let it run into the cotton? It can be done just as well in the upper jaw as in the lower, and it would save time.

I do not know what will be the right thing to say to you about this, so you will appreciate what a help it can be to you and your patients; but perhaps one of the things that will help those of you who are considering it, or who will come to consider it, will be to describe the practical method of using it, in addition to what Dr. Morton has said. It is a very desirable thing,—almost an essential thing,—in working on a tooth, to insulate the tooth,—that is, to apply the rubber-dam; because it is difficult to keep the moisture away from your electrodes sufficiently long to make satisfactory application. It is also desirable to insulate metallic fillings that may be sufficiently close to the tooth you wish to treat to be touched with the wet cotton or electrode. If your patient is at all sensitive to the changes and quantity of current, you will find it much simpler to cover those fillings with a bit of gutta-percha, or something of that sort, to insulate them. I think there is no necessity for doing anything to the cavity beyond the mere breaking in of the frail edges so as to get your cotton satisfactorily placed. I decidedly prefer a solution of twenty per cent. or stronger, because I am accustomed to use the strong solutions, and they seem to me to work more rapidly and more satisfactorily. The length of application is the main objection; but the time consumed in making the application is, in the majority of cases, fully made up for by the time you save in working on your cavity after it has been sufficiently benumbed. Seven minutes is the minimum for satisfactory results of the cases that I have recorded. I mean by that an absolute and entire benumbing of all the territory that I wish to cut out, in shaping the cavity, either with the hand-instrument or the bur. Some of the cavities that I have in mind were cervical cavities near the edge of the gum, and some were approximal cavities. The other limit is, just as Dr. Morton stated, twenty minutes or half an hour. In eight months I have accumulated about half a dozen cases in which the time ran up to twenty minutes or half an hour. I think we shall be able to get the time down. I am working along some of the lines that Dr. Morton suggested. We may possibly have good results from what he has suggested to us to-night in the use of guaiacol. I am sure we shall, in the use of the same principle which he mentions in connection with pyrozone; that is, the use of sodium chlorid, or sulfid of soda solution, or something of that kind, to add to the conductivity.

One of the questions that has come up very frequently when I have talked of this matter to other professional men is whether we would injure the pulp in doing this. I have not been able to find any evidence whatever that we are likely to do so. Some of the first cases in which I made experiments have been continuously under my observation. Stronger currents were used than was necessary, and there has been no evidence that there was any effect on the pulp beyond a slight irritation in occasional cases, but not a long-continued one,—an irritation that it is difficult to distinguish from the irritation following the insertion of a metallic filling in any sensitive cavity. I was pleased in asking Dr. Morton the question, two or three weeks ago, as to whether, from his standpoint and in the light of his experience, he would apprehend that there would be ill effects on the pulp, to have him reply that he did not think there would be. To those who have the fear that there will be ill results, it will be reassuring to study the paper read by Dr. Marshall, of Chicago, before the American Dental Association some time ago and published in the DENTAL COSMOS. Dr. Marshall says in that paper that he used applications of the galvanic current for the allaying of irritation in pulps, and records cases that have been under his observation, and one in his own mouth of ten years' standing. At that time I had the same questions as are in the minds of other gentlemen, and it was very reassuring to me.

I do not know that there is much more to be said. What I have said has been rather in the direction of giving you some little practical hints about the manipulation in using cocain. I really think if you will master the very slight technical knowledge that is necessary to use this method, you will find it a very great help in your practice. I have found it so in mine. One point that is called to my attention is the matter of the manipulation of the selector. In using it on sensitive dentine I always start at the lowest point, because occasionally the patient is so sensitive that he feels a little shock even if you begin way down. As soon as the patient shows by the change in the eye that he is becoming aware of the sensation, I explain to him that there is nothing serious going to occur, that there will not be much pain, and to warn me if there is pain. If the patient does feel pain, stop a half-minute just at that point, until the first sensation of pain or "almost pain" disappears. Then you may go on turning slowly; when you get to a quarter or half a milliampere, and you find that your cocain is beginning to tell, you may go on more rapidly. In average cases I get up in six or eight minutes to a point that I can best express by speaking of it in the number of volts used, which may be anywhere from fifteen to twenty. That will give you, in different cases, different quantities of current passing through the tooth. In certain cases it may be one-quarter of a milliampere, and in others two milliamperes.

Dr. RHEIN. What has been your experience in the average amount of milliamperes that you registered?

Dr. GILLETT. I can hardly answer that, because I have not had a very satisfactory milliamperemeter. It covers too great a range for this work, and it does not easily record fractions of a milliampere. The greatest amount I have ever seen passing through a tooth is four milliamperes. I was then using a very imperfect apparatus, and used it just as it was furnished to me. Two milliamperes is a large quantity, and I do not think I have seen that registered a dozen times. One milliampere is ample, and I have plenty of satisfactory cases where the milliamperemeter that I am using did not record anything. A more delicate meter would of course show the fraction of a milliampere.

Dr. WENDELL C. PHILLIPS. At this late hour I shall not presume to go into any elaborate remarks upon this subject. I feel that Dr. Gillett voiced the sentiments of all present, when he said it was time well spent to come and listen to such an exposition as we have had to-night from Dr. Morton. There is no doubt that there is much to learn in connection with this principle of electricity as applied to mankind. Although the principles of cataphoresis have been before the public a great many years, since about 1859, when they were demonstrated by B. W. Richardson, who wrote two articles on "Voltaic Narcotism,"* like many other things it dropped into disuse for many years, and only lately has it been revived to any great extent. Personally I prefer to bear in mind at all times that cataphoresis is a mechanical process. There is no chemical change taking place in the tissues when any remedy is used by cataphoresis. If you apply a zinc or copper electrode that would oxidize readily, and apply cocain at the same time, you would get a combination of cataphoresis and electrolysis. It is necessary for you to use some electrode that is not readily oxidizable. For that reason you use a platinum electrode.

Now as to the current which you are to use. I have had considerable experience with batteries. We are all looking for perfection in apparatus. I have had more peace of mind since I introduced the Edison current into my house than I ever had before. It may have imperfections. Dr. Morton's point that there is a very slight pulsation at times which might affect the current is, no doubt, well taken. It is hardly necessary for me to say that to all intents and purposes the Edison current is a galvanic current. The telephone is the most delicate instrument that has ever been devised for testing the current. It is so delicate that it would be affected by a very small fraction of a milliampere, and my impression is that even if there be a very slight pulsation, it would be a matter of but little importance, because it would be so slight that the nerve terminals would not be affected.

---

* *Medical Times and Gazette*, February 12 and June 25, 1859.

It might not be out of place at this time to say a word or two in connection with the physiological effects of the cocain on the teeth and the general system. You may have had experience in the use of cocain about the mouth, and occasionally found a patient who immediately manifests the physiological effects of the cocain. In my own practice on the throat, nose, and ear, I occasionally get those effects, and sometimes they are quite alarming. If you apply cocain in the cavity of a tooth and it is not applied to the gum, you confine it only to the cavity of the tooth and carry it directly into the dentine, the density of which is such that but little if any of the drug reaches the general circulation, and consequently you would get none of the physiological effects. My general interest in the application of cataphoresis to the dentine comes partly from the fact that Dr. Gillett, to whom is due the honor of first successfully using cocain cataphoresis in obtunding dentine, made his first experiments in my office. The very first experiment was so successful that I told the doctor that if subsequent experiments would carry out what he did then, the practice of dentistry would be revolutionized. I believe my prophecy is about to be fulfilled. With the Edison adaptor which I had we found that the current, even in small quantities, was painful; and if in your efforts to relieve pain you cannot do better than to introduce another pain, you might as well let it alone. Dr. Gillett felt it would be necessary to get some control of the current that would cut down the voltage. This instrument is the most perfect current-controller yet constructed, allowing an increase of even a fraction of a volt at a time. These experiments as carried out by Dr. Gillett in anesthetizing sensitive dentine afford a most beautiful illustration of the cataphoric process. It is the most convincing demonstration of cataphoresis as a principle that we have ever had.

I am thankful for the opportunity which your invitation afforded me of taking some little part in this discussion.

Dr. C. G. PEASE. Two medical men claim to have discovered last summer that iodin did not pass through the tissue from the positive to the negative, but that it did pass from the negative to the positive, as per experiments made by them. I see that Professor Morton states to the contrary. I shall be glad to hear from him on that point.

Dr. RHEIN. As I have had some little connection with the experiments mentioned by Professor Morton, I would like to say a word or two in reference thereto, especially to answer Dr. Gillett's question in regard to the possibility of discoloration from the use of guaiacol. In the first place, the experiments made on the teeth for sensitive dentine were made under peculiar difficulties. The work was done at Dr. Morton's office. The teeth had simply been placed in a preparatory condition, and very few dental instruments brought to his office. The work was done at night, and a further difficulty was that we did not have the benefit of the Wheeler fractional volt selector, which Professor Morton recognizes as being a decidedly better instrument for producing this effect on tooth-structure than the rheostat which he has found invariably successful in other work of this kind. It was undoubtedly a serious obstacle in the experiments which we performed that evening.

In regard to the guaiacol, the solution which I saw was absolutely colorless. I am not familiar enough with the article to know if there are different preparations of it, and if some of them have a creasote color; but the one we used was colorless. Another point that perhaps was not clear was that the cotton was placed in the tooth. It was not wrapped around the applicator, and the only reason the instrument was withdrawn during the operation was on account of the difficulties with which we were beset. We did not even have a pair of tweezers with which to apply the cotton, we were so lacking in dental instruments during the experiments. Still the fact remained that the experiment was successful, and the shortness of time required to produce the anesthesia augurs well for the use of this application with the Wheeler fractional volt selector.

Professor Morton spoke of the metallic application, and its possibilities in stomatological work. I have been very much interested in this phase of the subject, as he presented it to us, and I trust that all the gentlemen who are working in this field will follow up the line of thought which he has given us this evening. My work in that direction is of too recent a date to enable me to speak with any assurance in regard to what it is possible to accomplish. I have never believed in the utterance of expressions favorable to a thing until I am positively assured of ultimate success. When it comes to local anesthesia, we can make up our minds very easily; but when it comes to the cure of chronic pathological conditions, as we find them in pyorrhea alveolaris and alveolar abscess, we know that a few experiments are insufficient, and a few weeks' or months' experience is not enough to give us any reliable data or information. It opens up a field for the more thorough introduction of therapeutic agents to the seat we want to reach than anything that has been brought to our attention before, and I would especially call your attention to his point in regard to the use of chlorid of zinc in this way. The application we get here is the freshly prepared zinc oxychlorid in its nascent condition, where it unquestionably will be far more effective than chlorid of zinc that has been lying about our offices for quite a time.

I do not feel like closing my remarks without uttering my gratitude to Professor Morton for what he has done for us in this particular line. I personally met him, an utter stranger, and was so carried away by his scientific enthusiasm for the introduction of this principle in dental work that it impelled me to bring one of the very best of my patients suffering from pyorrhea alveolaris to his office for this work, and you all know what an unpleasant thing that is to introduce into private practice. We all owe him a great deal of thanks for bringing out something that promises so much. It induced me to make a special trip to Newport to Dr. Gillett, in order to obtain by a personal demonstration on my own tooth the positive realization of the anesthetic effect of the cocain produced by cataphoresis. I had that so well demonstrated that there is no question in my mind that it has opened up a new field in operative dentistry, as far as the obtunding of sensitive dentine is concerned.

Dr. H. W. F. CADY. It seems to be my duty to make a few remarks on this subject. You heard Dr. Phillips speak about the beautiful experiment made in his office. I was the patient on whom the experiment was made. I had a cavity in the buccal surface of a third molar which I could not allow anything to touch. Putting my finger-nail into the cavity would cause excruciating pain. I was a little shy of having cocain used, because I have always been very sensitive to the effect of it. I remember once having placed a four per cent. solution on the tip of my tongue, and in a short time it produced a very irregular action of my heart; in fact, the heart seemed to miss every third beat, and I feel sure that the hypodermatic injection of cocain would kill me. Dr. Gillett performed the experiment on this sensitive cavity in the third molar. He placed a pledget of cotton saturated with a ten or twenty per cent. solution in the cavity, which was so sensitive that even the cold (it was a cold solution) irritated it very much. He applied the current, and the effect was marvelous. I could feel the vibrations of the current on the tooth. It was similar to the flickerings we notice in the electric light in the street. When Dr. Gillett would ease the current a little, the pain was not so great. The pain was similar to the blowing of cold air into the tooth from an air-syringe. I could feel the current, and it was quite painful when it was applied with force. In about fifteen minutes the cavity was obtunded to such an extent that the doctor went in with an excavator where I could not allow him to touch it before, and excavated with a great deal of force. It had the same sensation as when one trims a finger-nail, and did not hurt me at all. I believe that cataphoresis will revolutionize the practice of dentistry, and one of the best ways for a doctor to prove it is to have it tried on himself, if he has a sensitive tooth. I think in a short time all dentists will have to have this apparatus in their offices.

Dr. LEROY. I would like to ask whether anesthesia in dentine can be effected by the application of electricity only, without medicaments.

Dr. GILLETT. If Professor Morton will allow me, I would say that if Dr. LeRoy will wait for the publication of the paper that I read some ten days ago before another society, he will find his question answered; but I will state in brief to him now the results of some experiments I made to answer just that question. In the paper referred to, I quoted experiments where the results obtained were such as you heard Dr. Morton describe to-night. I performed other experiments on those same cavities before using the current, by simply putting cocain solutions of different strengths in the cavities and letting them remain there fifteen or twenty minutes. This was to answer the question of the medical men who sometimes ask, "How do you know, if you put a cocain solution of that strength into the cavity, that you would not get that same anesthesia?" Of course, we dentists know we would not get it. I applied the electric current alone to those same cavities, using sodium chlorid solutions of different strengths on cotton, simply for the purpose of making good electrical connection with the cavities. The current had no anesthetic effect with the sodium chlorid solutions of various strengths. It was not used as a drug, but simply because it was necessary to use something to get electrical connection. In those same cavities I placed cocain solutions and applied the current for the same length of time, and got absolute benumbing of the dentine.

Dr. S. FREEMAN. I may possibly add a few words to the argument here this evening on cataphoresis. I have been using what is called the combination rheostat box which Mr. Wheeler made. I believe it was the second box that was turned out. I have used cataphoresis on sensitive teeth, and have found good results in eight or ten minutes. I also instructed Mr. Wheeler to make an electrode of hard rubber with metallic ends, on which I intended to place a pump so as to carry it near the end of the root, in that way bringing the current through the tissues in the treatment of pyorrhea alveolaris. Dr. Rhein spoke some time ago of using sulfuric acid. Dr. Herbst introduced a combination of sulfuric acid and cocain, to be used in sensitive teeth. It has been discarded, however, because the sulfuric acid seemed to break down the tissues of the teeth and the fillings failed. I would not like to use sulfuric acid with electricity for that reason.

Dr. BOGUE. May I ask whether cocain does not invariably act from the center toward the peripheral extremities?

Dr. MORTON. That would imply that the nerve had a selecting capacity, one way or the other; and we do not know of any such capacity. I consider that a nerve would be affected the same as a sponge would be, or any other homogeneous conductor, namely, merely as tissue.

Dr. BOGUE. I mean to say whether muriate of cocain, independent of the electric current, would not always be carried toward the peripheral extremities of the nerve.

Dr. MORTON. Its first action is to constrict the blood-vessels, and the way it carries is the same as it would be carried in a piece of blotting-paper, simply an even absorption into the tissues. I do not consider that there would be any direction in the absorption, as regards the nerves.

Dr. BOGUE. If you punctured the forearm, you would find the fingers numb, but not the elbow, would you not?

Dr. MORTON. I see now the point you mean. The innervation is sensory and from the periphery inward, therefore, if the nerve in its course were punctured and benumbed, the extremity would be numb, while it would not be above. You cut off the innervation. If the head is here, and the arm here, and the motor nerve conveys an impulse from within outward, and the sensory nerve from outward within, if you put cocain across here at the forearm [illustrating], you cut off the ingoing impressions from the sensory nerves, say of the hand, and therefore what you say would be true.

Dr. Gillett brought up the question of the discrimination between the battery and the street current. I think we may leave that for future experience. What I have stated as a fact was that it was a pulsating current, and not, as some one remarked, an alternating current. The pulp of the tooth is an extremely sensitive thing, and it no doubt experiences pain to very slight pulsations, because it is so sensitive. I must say that I never have any trouble with my batteries. I use Leclanché cells.

About guaiacol having a color, that was amply answered. The preparations that we have here, you will see, are perfectly colorless and clear. As to the renewal of the fluid, that is very important. If this is the cavity [illustrating], and this is the absorbent cotton, and this the applicator, then the layer that is first used up is right next to the dentine, and it becomes exhausted ; and you must either renew the supply as Dr. Gillett suggested, or remove it and renew the supply. I prefer the latter method. I am very certain that if I would take this rheostat, which I highly commend, I could reduce the time with my guaiacol-cocain application to four minutes on a sensitive patient. I am sure I could, because a great deal of our seven minutes was used in overcoming the scruples of the patient in regard to the use of the current. It has been suggested that the pellet, as put into the cavity, might be warmed.

I have never seen any soft tissue injured by this application. I have used it on my hand and arm, on patients' arms, and in all sorts of places, and I have never seen any injury to the tissue. As regards dentine, I see no reason why you should expect injury. A remarkably small current is used,—a fraction of a milliampere,—and there would be very slight electrolysis. Electrolysis and cataphoresis go hand in hand with the same current, and there must be some of each.

The permanganate of potash experiment was alluded to, and I want to answer that. Suppose you put your positive pole on the permanganate, and electrically push it into the pyrozone. You could do it, of course, but as fast as the permanganate reached the edge it would be decolorized, and you could not see the results of the experiment.

Dr. Pease asked which way iodin traveled. I know one way it does travel, and that is from the positive pole to the negative. He asks if it travels from the negative to the positive. I never tried it, and do not know. I read the experiment made by Dr. King and Dr. Frazer, which he probably had in mind. I noted that *two* septa were used, and I meant to make the experiment myself; but I never did. If you took potassium iodid, the result would be different. When it got around to the positive pole from the negative, as it might by diffusion, the iodin would be set free, and you would get free iodin at the positive pole, if you had put potassium iodid at the negative pole ; but with pure iodin alone and starch-water I should be astonished very much if it would find its way into the positive compartment.

Dr. Rhein referred to the metallic electrolysis. I would have liked to spend a long time on that part of the question, but did not have time. I want to say that silver at the positive pole makes a powerful salt,—almost as powerful as the zinc. Dr. LeRoy's question as to whether you can get anesthesia without cocain was, in the particular instance of electrical anesthesia of dentine, answered by Dr. Gillett. In general, I would say that many claims have been made that anesthesia and anesthetic effects can be produced by electricity. My old friend Dr. Hutchinson, of Providence, wrote a paper just before his death in which he said he could produce anesthesia by setting his

Faradic machine going, and applying the current when it recorded five hundred vibrations,—at C major, as he termed it. We all tried it, but we did not get any anesthesia. Claims have been made that teeth could be drawn by employing the Faradic current, and so obtaining a certain numbness which will enable you to draw the teeth ; but that is like hitting a man in the head, and while he was occupied about that, you drew his tooth. If you take the Faradic current at the end of a needle, and hold it against the skin, and a fine vibrator is employed, say five hundred per second, as long as the needle is against the skin and the current flows there is a diminution of pain, and while the current is flowing you can get that condition ; so there is something in it. There is a certain obtunding effect from the Faradic current, but not enough to do practical work.

Dr. Freeman made some remarks about sulfuric acid which probably interest you. I know nothing about it. There is only a small amount of sulfuric acid in one of the prescriptions I offer. Of course, almost everything has been used topically to produce anesthesia. The question is now whether you can, by the aid of electricity, drive medicines into tissue and get an anesthesia that you did not think of getting before by aid of any topical application whatever.

Dr. GILLETT. I am very much surprised to hear any one advance the old theory of using strong mineral acids in an obtunding solution.

Dr. MORTON. I wanted to point out this one thing. If you have a battery, and use the old "cell selector," running in one cell and then another, and so on, that is the way we used to work ; but now we use a rheostat, and we put in our forty cells at once, and turn off the resistance. This new fractional volt selector of Mr. Wheeler does almost exactly what the old cell selector used to do ; only this apparatus, as it is explained to me, puts in a *fraction* of a cell at a time, or a *fraction* of a volt. Therefore, instead of being the old-fashioned selector, it is called the "fractional volt selector," and it can be used to regulate the flow from the street mains. If electricity were put into the patient's circuit cell by cell at a time, of course the patient would not stand it an instant.

I thank you very warmly for the kind words of approval you have addressed to me. I am glad to take part in a discussion like this, and I shall feel amply repaid for any energy and interest I have put into the subject if any one patient of yours has any less suffering, and if any one of you gentlemen find your professional labors in the slightest degree shortened by any remark I have made.

A unanimous vote of thanks was offered to Professor Morton.

B. C. NASH, *Secretary*.

A clinic was held at Lyric Hall on the afternoon of January 14, 1896, when Dr. H. J. HULL, chairman of the Clinic Committee, presented the following

CLINIC REPORT.

At the request of Dr. GILLETT, who was detained by illness, Dr. J. G. PALMER demonstrated the use of guaiacocain in obtunding sensitive dentine by the use of electricity, using the "Wheeler Fractional Volt Selector."

The first case was a large buccal cavity in the right inferior second molar. Two applications were made: the first for seven minutes, reaching four volts; the second for ten minutes, reaching twelve and one-half volts. The anesthesia was perfect, and continued for forty minutes.

The second case was a posterior approximal cavity in a left superior central. Application continued eight and one-half minutes, reaching thirteen volts. Anesthesia was complete.

The third case was a right inferior first molar, a large buccal cavity, larger and longer than in first instance, extremely sensitive, responding to slightest touch. Two applications were made: the first for eight minutes, reaching fifteen volts; the second for six minutes, reaching nineteen volts. Anesthesia was not as profound as in the other cases, but sufficient to permit of entire preparation of cavity.

Dr. Palmer also presented a case of bleaching, a left superior central, having used the electric current with twenty-five per cent. aqueous solution of pyrozone.

Dr. T. P. BELYEA, of Brookline, Mass., showed method of attaching bands to Logan crowns. A cap is fitted over the end of the root with a hole in it for the pin, then a narrow band is fitted to the crown. The crown is placed in position, and the band and cap fastened together with wax; the band and cap are removed, invested, and soldered, when the whole is put in place with cement. Also method of making solid gold cusps to porcelain faces. After band, pin, and tooth are fitted and waxed together, the articulating cusp is built up of wax trimming, to the exact shape desired. Then the whole is invested upside down, the wax carefully removed, and solder is flowed in to fill the mold.

Dr. MCBRIAR, of Middletown, exhibited an electric furnace for baking porcelain.

Dr. S. C. G. WATKINS took partial impressions of the mouth by first pressing wax around troublesome teeth, then taking plaster impression of the whole in the ordinary way.

Dr. T. E. TIBBITTS, of Rockland, Me., filled a buccal cavity in a superior right bicuspid, the cavity extending from mesial to distal surface, and well up under the gum. The dam was applied without ligatures or clamps, but was held above the cervical margin by an old-time elevator with the convex surface uppermost. The gold was started at the mesial end, then along the cervical wall to the distal end, thus back and forth until the cavity was full, the burnisher being the only instrument used to condense the gold. Six or eight similar fillings were shown, with excellent marginal adaptations.

Dr. WALTER C. MASON exhibited detachable porcelains for crown- and bridge-work. The porcelains have a flat back with a three-cornered platinum wire running its length. This wire fits in a platinum groove soldered on the crown- or bridge-work. As the grooves are all the same size and the wires likewise, they are readily interchangeable without removing from the mouth.

Dr. H. S. SUTPHEN, of Newark, filled a large distal cavity in superior left central with plastic gold. The gold was condensed entirely with hand pressure, using broad, finely serrated pluggers.

Dr. G. ALDEN MILLS showed an operation in his own mouth performed by Dr. J. W. Clowes. Owing to malocclusion, the upper left first molar had become very loose and sore. The pulp was removed and roots filled; then a groove was cut through the crown in a line with similar grooves in the second bicuspid and the second molar. A wire was laid at the bottom of these grooves and filled over with amalgam, forming what Dr. Clowes terms a "Grand Molar."

Dr. GEORGE F. REESE exhibited a case of necrosed lower jaw. He applied bichlorid of mercury (1 to 2000) dressing to the face and mouth for four months; then the dead bone was burred out. The antiseptic dressings continued, and the result was a complete cure with almost no scar-tissue exposed.

Dr. W. J. YOUNGER, of California, illustrated his method of regulating with silk cord, taking advantage of the elastic properties of twisted silk, at times attaching both ends to the teeth, at other times attaching the fixed end to a plate. Wishing to turn a tooth in its socket, he takes three turns with the unwaxed silk, then brings the waxed ends around to the fixed point.

Dr. HASBROUCK extracted two roots that had been anesthetized by cataphoresis. The anesthesia was complete, and the operation, as such, was a complete success; but a subsequent examination of the mouth showed considerable sloughing of the mucous membrane at the point of contact with the electrodes.

Dr. DAVID GENESE treated a fistulous opening at one sitting by fusing a little nitrate of silver on a small ball burnisher, and forcing it through the fistulous opening to the apex of the tooth, thus scarifying the tract completely. The root was then filled. Subsequent investigation showed the fistula completely obliterated.

Dr. JOSEPH HARVETT showed a case of mistaken diagnosis. A large swelling inside the upper arch had been diagnosed by physicians as cancer, but a dental examination showed an undeveloped cuspid, the temporary cuspid being still in place.

SECOND DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

REGULAR meeting, December 9, 1895.

INCIDENTS OF OFFICE PRACTICE.

Dr. F. T. VAN WOERT. Some months ago I undertook to prepare a large crown and approximal cavity in an inferior left first permanent molar, but found it so sensitive, and the patient in such a highly nervous condition, that I gave it up in disgust. As I did not want to lose the time set aside, I prepared the adjoining bicuspid, which was pulpless, for a crown. This operation was after the Callahan method, using a fifty per cent. solution of sulfuric acid. I took no precautions against the acid getting into the live tooth, and after finishing the treatment of the bicuspid, still having a few moments left, I made another effort to do something with the first-named tooth, when, greatly to my astonishment, all the sensitiveness had left it, and I had no trouble in completing its preparation for filling. At first I was somewhat worried for fear the pulp would die, but after careful thought I came to the following conclusion: First, that sulfuric acid was self-limiting in its action, and therefore, if used with care, it would obtund to a limited depth only; second, that if this were true, a perfectly controllable obtundent was at hand. I have been using it ever since, with just as good results, and, as far as I know, no bad ones following.

Dr. M. L. RHEIN, New York. Having had a very interesting case in the office to-day, for which it was necessary to devise a special apparatus, I deferred inserting it until to-morrow, in order to exhibit it here this evening.

About four years ago there came under my hands for treatment a young lady, for whom I did considerable work before her mouth was placed in complete order. Previous to coming under my care she had considerable dental work done in Paris, and, as a result thereof, a number of the teeth were found to be devitalized, the pulps not having been removed. In connection with the right superior second bicuspid there was an alveolar abscess discharging freely about the end of the root, and which had been in that condition for such a length of time that it could only be classified as chronic. After completing all the ordinary work in her mouth, particular care having been taken to thoroughly and carefully fill the root of this bicuspid to the very end, I informed her that it would be impossible to make a radical cure of this abscess without amputating the end of the root, and that if this were not done I would prefer the removal of the tooth rather than have it remain in position, especially taking into consideration its close proximity to the antrum.

She took the matter under consideration, but she never gave me the desired opportunity of operating on this root. In fact, for a couple of years I lost sight of the patient until about four or five weeks ago, when I was hastily called in consultation by her physician. She had been married in the interim, and was then pregnant about five months. When I saw her, there was a temperature of over 102° F., with a very considerable swelling in the region about the right eye. Having brought a diagram of her mouth, showing exactly what had been done, I was soon enabled to diagnose a condition of antral abscess. I noticed that the bicuspid had been left by me with a large contour gold filling extending around both approximal sides of the tooth. I now saw that an amalgam filling had been inserted in the center of the crown. She vigorously denied, at first, that she had been under any other dental treatment since I had seen her last, but after pointing out to her the convincing proof shown by the amalgam filling, as to the incorrectness of her statement, she confessed, with a little chagrin, that on feeling some irritation from the old abscess she had consulted a dentist who had been recommended to her especially for the cheapness of his fee.

The tooth was extracted, and this was followed by a profuse discharge of pus. The opening into the antrum was a very small one, taking only a very fine probe. I have brought with me this evening that tooth, in order to show you what is sometimes done in the hurry of office work. The dentist to whom she applied, instead of endeavoring to discover what was the condition of the interior of the root-canal, drilled through the center of the crown into the canal, striking there the oxyphosphate of zinc covering the gutta-percha which sealed the canal. Endeavoring to drill through this, he proceeded but an eighth of an inch before he penetrated the side of the root, and then completed his operation by forcing a mass of pink gutta-percha fully one-half an inch through this artificial opening. The result of this increased irritation was a weakening of the floor of the antrum at this point, and the subsequent penetration of purulent germs into that cavity. My original filling can be seen reaching to the very end of the root. In order that there may be no uncertainty as to whether I may not have forced this mass of gutta-percha through the root, I will say that it is my invariable rule to use white gutta-percha in root-canals, while this mass that has been forced through the side is pink gutta-percha.

Having on my hands a patient pregnant about five months, with a condition of chronic empyema, it was impossible to perform the surgical operation necessary for a cure of this condition, and it was absolutely necessary to keep the antrum absolutely aseptic and clean. Perhaps this treatment alone might cure the disease ; if not, it would aid in the subsequent operation that would be necessary. The ordinary method of syringing out the antrum through the fistula was found to be productive of great pain to the patient. In fact, she was so prostrated from the effects of the syringing that it was soon determined that some other method would have to be employed, especially one that would be easy of manipulation during her confinement, so that she would be able to take the proper hygienic care of this inflamed antral surface. My associate, Dr. C. L. Andrews, materially assisted me in devising and manufacturing this little apparatus which I successfully inserted in her mouth to-day, and by means of which the antrum was thoroughly cleansed without any inconvenience or annoyance, and by means of which she will be able to take the proper care of it daily for any length of time to come.

I removed the apparatus so I could show it to you this evening. You see here a curved platinum tube, which fits perfectly into the alveolar socket, and is made a little larger after entering the antrum, so that the tissues will readily hold it in position, and it cannot easily be withdrawn with the apparatus that prevents the oral secretions from entering the tube. At the same time, the open ends of the tube at the gingival border flare over both the buccal and the palatal side of the process, so that it cannot be pushed up into the antrum.

In this tube is fitted an ordinary canula, with a knob soldered around it at the point where it should cease to enter the tube. To this canula is attached rubber tubing, with a stopcock close to the canula. The tubing is attached to a glass jar suspended in a metal frame. By placing the cleansing solution in this jar and elevating it to the proper height, we found that we could painlessly wash out the antrum in the most thorough manner, the fluids leaving by way of the right nostril. This is done so easily that the patient will be able to cleanse the antrum daily as frequently as may be desired. To the open end of this tube has been accurately fitted a platinum cone-shaped nipple, which acts as a positive stopper to the tube. This nipple forms part of the under surface of a strip of platinum, to which is attached a porcelain tooth, and this in turn is held in perfect juxtaposition by means of clasps around the molar and first bicuspid, and with metal rests attached alongside of these clasps, and holding on to the occlusal points of the molar and bicuspid, so as to prevent the apparatus pressing upward on the gum.

The patient will use a cleansing solution of boracic acid and glycerol, and if the thorough cleansing by this method does not bring about a positive cure, a thorough surgical operation will be made. As the case bears so closely on the paper that I am about to read this evening, I have taken the liberty of describing it at this time.

Dr. RHEIN then read a paper entitled "Alveolar Abscess: Preventive and Curative Treatment," which will be found at page 193 of the current number.

Discussion.

Dr. G. LENOX CURTIS, New York. Here is a string of one hundred teeth selected from about a peck sent to me from extracting headquarters.

They show various causes for alveolar abscess, also by their irregularities in length, shape, and size of roots, the impossibility of "reaching the apex of every root" from within the canal. They also reveal supernumerary roots which ordinarily are overlooked in the search for canals.

Dr. Rhein in his excellently prepared paper conveys the idea that alveolar abscess comes from the one cause,—*i.e.*, decomposed pulp,—and that most of the teeth on which an abscess is found are necrosed or carious. These teeth show but two per cent. of this condition, and in my opinion it rarely exists. The very tooth he presents as proof of his theory—*i.e.*, internal cause—shows plainly that the abscess was from external cause; the gutta-percha protruding through the puncture at the upper third of root being the irritating cause.

The disease of antrum I believe existed long before the root was punctured and filled. This leads me to speak of the apparent great waste of time to the dentist and patient and almost invariably total failure attained when he attempts the treatment of a diseased antrum.

I see nothing new in Dr. Rhein's drainage-tube; his ingenious appliance for retaining it seems weak in the fact that the flange is not sufficient to prevent the tube being forced into the antrum. I have removed as many as four such from one antrum.

Fully one-eighth of the abscessed teeth have shown that the disease is due to external causes. It is my belief that to cure a disease the cause must first be removed, therefore the canals must be cleansed to the apex of all septic material and then filled with a non-absorbent material, or disease will recur.

The canals should be reamed out as far as possible, filled, and the root amputated at a line with the filling.

We have no rule for guide in opening roots of teeth.

As you see by the teeth here presented, the roots vary in length from one-sixteenth of an inch to an inch. I think it is a fatal mistake in the treatment of alveolar abscess to open and treat through the apical foramen. How can one expect to perfectly fill the canals under such circumstances without forcing the material beyond the apex and thereby producing an irritating result?

In cases of this class referred to me by dentists, the most frequent cause of failure to cure is the overlooking of one or more canals, leaving them wholly or partially uncleansed.

This is often due, as shown by the essayist, to insufficient cutting away of the tooth so as to allow direct access into the canals. If dentists would but realize how easily alveolotomy converts a "blind" into a simple abscess, they would have less difficulty in coping with this disease. Too often they look for the abscess beneath the fistulous opening in the gum, when it perhaps leads to teeth far remote and possibly beyond the median line.

Few dentists apparently are familiar with the anatomical structure surrounding the tooth, hence the fear to perform so simple an operation as is required to reach and remove the disease at the ends of the roots of teeth. Some who do this apparently do not know when to stop their treatment, which is a continual irritation and a menace to successful results.

As a rule I find three visits sufficient to completely cure this state.

Unless the bichlorid of mercury be acidulated, it coagulates the albumin found where germ life exists, and does not destroy the germs. Dr. Rhein does not say the bichlorid of mercury solution has been so treated. The advantage of the acid is to neutralize the medium in which the germ is found, so as to allow of the deadly action of the mercury.

The great pain to which he submits his patient is I believe due to the distension of the sac in consequence of the bichlorid solution forced into it, which acts the same as when it is distended with pus. The mercury being an irritant may account for some of the pain. Such torture seems unnecessary when a few drops of a solution of cocain can by means of a hypodermic syringe be carried into the sac.

I see no reason why the canals should not be immediately filled as soon as all septic material is removed from them.

It seems to me a mistake to cap pulps which have become inflamed, as so few of them are so completely reorganized that they give no further trouble.

Perhaps one of the most frequent causes for devitalization of pulps is the large metal fillings placed in direct contact with sensitive dentine. If all such cavities were first lined with non-irritating and non-conducting substance, fewer alveolar abscesses would follow.

Dr. W. J. YOUNGER, of San Francisco, Cal. The only criticism I have to make of the excellent paper of Dr. Rhein is injecting bichlorid of mercury into what would be a blind abscess. In cases of that kind, I have always drilled through the gum to the root. I have been very much edified by the remarks of Dr. Curtis.

Dr. D. W. BARKER. I find myself unable to coincide with Dr. Rhein in some of the points of his paper. In regard to his using an antiseptic in a putrescent pulp-canal, why any man should wish to use an antiseptic in such a case I am unable to conceive. I claim that the use of an antiseptic in such a case is absolutely useless. What is an antiseptic? The definition is a preventive of disease. Now, in a putrescent pulp-canal you already have putrefaction. A familiar illustration of the use of an antiseptic is in the use of salt to preserve meat. But suppose the meat is already decomposed, can you imagine a reason for using the salt when you already have the condition you seek to prevent? After the meat is decomposed, of what use is the salt? Will it restore it to its naturally healthy condition? Disinfection, however, is of a very different nature. In the dictionary it is defined as an agent which removes the cause of putrescence. I have always kept a very careful record of all my dead teeth, a record which records every detail in regard to them. Now, I have never used bichlorid of mercury in a tooth end in my life. If it is so essential, would I not have realized it? Would not the omission of it have handicapped me? The very fact that success is had without it shows that it is worthless. Now, in regard to root-filling, I did not rightly understand whether he filled the apex of a putrescent canal or whether he filled the whole canal. I understood he filled the whole canal at once. I cannot approve of that. Bear in mind the construction of a tooth. It is composed of a mass of minute tubules radiating from the canal to the periphery. When a pulp becomes putrescent, the whole tissue becomes saturated with the products of decomposition. Can you remove all that at one treatment? I cannot.

Now, in regard to the use of the rubber-dam, in the case of a putrescent pulp-canal I never put it on. I take no care about going into such roots the first time. With a putrescent pulp, the tooth is very sore and painful, and why should I subject the patient to the trying ordeal of so much drilling and such intense pain as the doctor has spoken of, when it can be done by a method in which great pain is not necessary? So long as I can get into the canal, I do not care if it is not very far at first; and when the inflammation has subsided, I can then go on and give more thorough treatment.

These are the points on which I cannot agree with Dr. Rhein in the paper which he has read this evening. The practical experience of a number of years, together with a very carefully kept record of all my teeth and work, bears out the force of my remarks.

Dr. F. T. VAN WOERT. I think the subject of this paper this evening is really a very interesting one, and Dr. Rhein has handled it very ably, and for this reason I dislike to suggest anything contrary to his views. Nevertheless, I feel that Dr. Rhein has overlooked an important point that I should like to speak of. I am thinking at present of the replantation of teeth. I am very much disappointed that Dr. Rhein has said nothing in his paper of the replantation of those teeth which will not respond to other treatment. This to me is a very important consideration, and I am surprised that he has ignored it. I am aware that the life of replanted teeth is limited, and, granting that the average is but five years, I think it the proper course to pursue under the circumstances first mentioned. I am in full accord with all that has been said and presented in the paper, but believe that an important addition would be the recommendation of the operation of replantation when other treatment fails.

Dr. J. P. GERAN. The result of replanting teeth is that about eighty per cent. of them are lost. You will find, I think, that the record of replanted teeth among the cases in this country is about that. Once in a while I come across one that will last ten, fifteen, or twenty years. I have one I planted twenty-three years ago, but that does not alter the case at all in my mind. It is the testimony of men of great experience that eighty per cent. of these replanted teeth are lost inside of eight or ten years.

Dr. RHEIN. I have jotted down so many notes during the interesting discussion that has taken place that you will be obliged to give me a little indulgence. I will endeavor first to reply to the last remark of Dr. Curtis. I have no recollection of there being anything in my paper concerning my successes or failures, except what may have been construed as such in reference to the one particular operation of amputating the ends of an exposed root. While I am in thorough accord with the idea of describing practical cases as the best means of illustrating a subject of this nature, yet on account of the length of the paper, I considered it ill-advised to do so. I might say, however, that from the day I entered into practice there has always been recorded and filed away a detailed and exact account of all work done in my office,—filed in such a manner that at a moment's notice I can find the details of any particular case.

In writing a paper for a society meeting of this kind it would be very strange if I did not overlook some matters, and if I should endeavor to bring up everything that pertains to the subject there would be no time for you to listen to it, much less to have any discussion on it. Some of these points that were overlooked were well taken. I thoroughly agree with his remarks in regard to abscesses being due to the anatomical irregularity of the roots in a number of teeth, as when four or more roots are found in a molar. Cases of this kind are not so very rare, and I am glad to take this opportunity of emphasizing the necessity of an operator being positive that he has removed the contents of every root that a given tooth may have.

As a possible preventive of alveolar abscess in teeth where the cavities are very deep, nothing can be said against the use of a non-conducting material under a permanent filling; it comes under the routine of every-day practice. I take exception to the criticism that my paper limits the causes of abscesses to one particular thing. While, as I have just stated, I omitted to mention numerous factors that have a distinct bearing on this subject, I distinctly emphasized the fact that we meet many cases of abscess from teeth where no caries has ever existed, where the pulp has gradually died away at the end of the root, leaving portions of living matter nearer the crown, and the abscess is the result of other causes than any distinctive tooth-trouble. If I had desired to go into this portion of the subject at any length, I could have mentioned many causes concerning which we have heard nothing this evening; but if the gentleman had heeded the opening remarks of my paper, he would have noticed that I specifically state that I did not intend to devote any particular attention to the etiology or pathology, but rather to devote myself entirely to the treatment of this affection.

In regard to the question of filling the ends of roots which are more or less open, I desire to add right here that if the canal has been thoroughly cleansed, if the apical space beyond that canal is thoroughly cleaned, and the part healthy, so that there is nothing left beyond that point that is capable of degenerating into pus,—if we have such an ideal condition as I claim should exist, I am not particular if a portion of gutta-percha does protrude to a slight extent beyond the end of the root.

There is absolutely nothing of an irritating nature about gutta-percha, and we know by clinical experience that it can be packed around the soft tissues of the mouth without exciting any undue irritation. I do not mean by this that as large an amount of gutta-percha should protrude beyond the end of the root as was shown to you in the case that I presented this evening; but when it comes to a question of the filling-material either not being absolutely flush with the end of the root or protruding to a slight extent, the latter condition is to be preferred as being absolutely harmless, while the former is open to all the objections of inviting the destructive action of micro-organisms.

In practice it is my custom to determine when the gutta-percha has reached the very end of the root by the evidence on the part of the patient of a slight feeling of pressure.

One of the especial points of attack which was made in regard to the treatment which I had outlined I felt certain would be made; I have reference to the objections urged to the injection of the solution of bichlorid of mercury and peroxid of hydrogen into the canal. These criticisms have been of a varied nature. The one made by Dr. Barker, that I used antiseptics in the presence of putrescence, should not have been made had he closely followed the reading of my paper. I challenge him to find a line making such a statement. What I did say was that I first thoroughly remove all the contents of the pulp-canal, including all putrescent matter, by means either of potassium and sodium or with sulfuric acid. If the canals are not too dry, I prefer the former treatment, which is generally the more successful of the two with me; but in cases where there exists an extreme dryness of the canals, this works so slowly that the sulfuric acid is to be preferred. The solution of bichlorid of mercury in peroxid of hydrogen is not injected until every particle of putrescent material has been destroyed. My instruction to my students on this point has always been very forcible. What I desire to obtain is the action of the bichlorid of mercury in peroxid of hydrogen on a healthy surface, and I claim that as far as any bad effects from a coagulation of the surface is concerned, there is nothing to warrant such criticism, because the menstruum holding the bichlorid of mercury in solution—that is to say, the hydrogen peroxid—contains a sufficient amount of acid to nullify any such coagulating effect.

I do not use this solution where an abscess has been active for any length of time, or where I feel certain that an abscess is going to form. I do use it, however, as the most powerful prophylactic measure that we have at our command, in order to abort an abscess, and frequently to prevent the necessity of such a surgical operation as Dr. Curtis has mentioned. In my opinion, it is far preferable to resort to this heroic measure and give the patient severe pain for a couple of hours, if need be, rather than to have on your hands for treatment an attack of acute alveolar abscess and all the attendant difficulties pertaining to the cure of such disease.

I have wondered whether Dr. Barker is not a homeopath, that he should take such a violent dislike to such a beautiful remedy as mercury. I do not deny that he can obtain the same result by other means; I merely stated this as the method which I advocate, and it is quite superfluous for me to say that because he can cure alveolar abscess by some other process, it is not absolutely necessary to damn mercury because I happen to prefer it.

It was a great surprise for me to listen to his remarks about his method of treatment without adjusting the rubber-dam, and I cannot leave this discussion without stating positively that it is my firm conviction that at this date there is absolutely no excuse for performing any operation upon any individual tooth without first adjusting the rubber-dam, if such a procedure be at all possible. His method of making a simple opening into the pulp-chamber in order to relieve the suffering of a patient, and then leaving this open canal free to the ingress of all the micro-organisms of the mouth, is so out of date with our bacteriological knowledge of the present day that it requires no words of mine to condemn such a method of treatment.

In reply to Dr. Van Woert's remarks that he was surprised at my lack of reference to the treatment of alveolar abscess by means of extracting and then replanting the diseased tooth, I can merely say that as I was opposed to any such form of treatment, I could see no occasion for dwelling upon it in my paper. I will say further, in answer to the remarks of Dr. Curtis, that this may be a last resort,—that it will be found to be a futile resort ; in other words, if a case of alveolar abscess cannot be cured by amputation of the diseased portion of the root, with the tooth left *in situ*, it will be a hopeless task to attempt to replace such a tooth after it has been extracted.

I agree thoroughly with the remarks of Dr. Geran on this subject, in regard to the small percentage of replanted or implanted or transplanted teeth that are saved. I also take issue with the statement that five, or even eight or ten, years of service from a tooth treated in this manner should be considered a success, as, when it is finally lost, there always occurs such a loss of material of the alveolar structure as to be a great bar in the way of replacing such lost tooth with an artificial substitute. Stop for one moment to consider the physiological differences that exist between the two methods of treatment. In replantation, you replace in the alveolar socket a foreign substance composed of a large percentage of inorganic matter, and consequently predisposed to more or less rapid resorption. On the other hand, in the treatment by amputating the diseased portion of the root, we retain undisturbed the healthy pericemental connection around the portion of the tooth nearest the crown. Such a tooth, even though the major part of its root has been removed, if it is not attacked by some other disease, is capable of doing faithful service during the remaining lifetime of the patient.

In closing, I desire to apologize for the length of time I have necessarily taken, and desire merely to add that, in regard to Dr. Curtis's remarks concerning the case presented by me this evening as to the possibility of the tube slipping up into the antrum, I have taken what I consider most ample precautions to guard against what I well know would be a deplorable result. The case was treated in the manner outlined because, as the patient was going to be confined to her bed for some weeks, it was necessary to give her an apparatus by means of which she could treat the antrum herself, without any professional assistance.

W. J. TURNER, *Secretary.*

ACADEMY OF STOMATOLOGY.

THE regular meeting of the academy was held December 17, 1895. In the absence of the president, Dr. JAMES TRUMAN, vice-president, called the meeting to order.

After the transaction of some society business, Dr. LOUIS JACK was called upon to read the paper of the evening, and said, in introducing the subject,—

When some one suggested that the implantation of teeth would be a useful subject to bring before this academy, I agreed to make some presentation of it in order to facilitate discussion. I presumed that what I might have to say would be very short indeed, merely covering the general points of the subject, but I found, after I entered upon it, that it would be better to go over the whole field, omitting some details. I have dealt with it in a very simple and elementary manner, and have avoided as much of technical language as possible, so that it would be comprehended by students as well as by ourselves.

(For Dr. Jack's paper, see page 185 of the current number.)

Discussion.

Dr. W. J. YOUNGER, San Francisco. Somebody asked me a year or two ago if I had abandoned the implantation of teeth, and the reason he gave was that he had heard nothing on the subject from me for a number of years. I said the reason I had not written about it was that I had given it to the profession years ago, and was simply now waiting for time to show how far the operation was successful.

The first case I had was a young maiden, an Italian. This, to my surprise, remained in eighteen months. All her friends came up and shook the tooth, and found it had become as firm as the others.

My next case was the 17th of August, succeeding. I planted five teeth, two of them on that day, the 17th, one a week later, one about the 1st of December, and the fifth one, a molar, in the year following. So that leaves four teeth that have been in four years, one over ten years, and one ten years about the first of next August, and they are all in perfect condition. A year or two ago, Dr. Daboll, of Paris, saw them, and he could not determine the implanted teeth, or distinguish them from the original teeth.

There are quite a number of other cases that are from nine to ten years of age that are in excellent condition.

A week or so before I left, a lady visited my office and complained that one I planted for her nine years ago was loose. I examined it and found what I supposed was a case of resorption of the root, so I made an appointment, and prepared a tooth for a case of transplantation; when I started in to remove it, I found to my surprise a solid tooth. The one that had been planted nine years last April was in perfect condition. This shows that the operation is a permanent one; that is, if an operation will last ten years, you may look upon it as permanent. It promises, in the case I have mentioned, to last a lifetime, because there is nothing to indicate in appearance that there has been any absorption at all.

In regard to the operation, I would like to ask Dr. Jack how he makes his incision, because I think that is important in securing an artistic effect.

Dr. JACK. I generally make the incision with the circular knife.

Dr. YOUNGER. In case there would be much absorption of the alveolar border, that will give an inartistic appearance. I would like to show how I perform the operation to get an artistic result.

A lady went to New York for whom I planted four teeth. I sent her to a gentleman there who had performed this work a great deal, and who makes a specialty of it, and I followed in three weeks. He said, "How do you do it? These teeth have been in six weeks, and I couldn't tell which of them you had planted." I said, "The thing ought to be done artistically." We want to resemble the teeth that grew there, otherwise I do not consider the result artistic.

The majority of the profession look upon the operation as a thing to be dreaded. After the tooth has been thoroughly cleansed and all the substance removed, it is incapable of carrying infection. The only bacteria we have to dread are what are known as surgical bacteria, streptococci and staphylococci. We don't care for the tubercular or syphilitic bacteria, as these are easily destroyed. Before performing the operation the mouth should be thoroughly sterilized, even the tissues underneath the gum, with a delicate syringe, and the person should gargle his throat; if possible, make the territory of the operation perfectly inhospitable to pathogenic germs; then, of course, the instruments should be sterilized; the hands should be thoroughly sterilized, and the finger-nails especially, to see that there is no dirt; remove this with soap and hot water and then sterilize them. With all these precautions it is impossible for bacteria to infect the parts. Then after the operation every two hours the patient should sterilize the mouth, and it should be kept aseptic as long as the wound is open. I think it is due to these precautions that I have met with so much success.

The doctor then proceeded to illustrate by blackboard drawings his method of forming the flaps of gum-tissue in order to secure an artistic restoration of the festoons and gingival margin, explaining the cuts as he made them.

Dr. DARBY. Do you inject cocain into the gum, or etherize the patient?

Dr. YOUNGER. I inject cocain.

Dr. DARBY. I want to bear testimony to the successful implantation of four teeth I saw in a mouth that Dr. Younger planted at least eight years ago. There were two centrals and two bicuspids, which had been in eight years. With one of the centrals resorption had taken place, and I was forced to replant another tooth in its place. His remarks in regard to artistic appearance I can fully verify: the appearance was certainly beautiful, and there was no recession of the gum present.

Dr. YOUNGER. A gentleman who had been in the Confederate service, and who had in a charge lost three centrals and a lateral, came to me for advice five years ago. He had no alveolus except at the very end of the root. In this same gentleman one of the laterals I implanted had two failures; with the third attempt I had excellent success.

I had a case where a lady came to me to have a tooth implanted, a right superior bicuspid ; this was nine years ago, and I defy any dentist to select that tooth by observation or by resonance. She had one tooth out, the second superior bicuspid ; another one was diseased at the root, and she decided to have that one out and one implanted, and I performed this operation four times before I succeeded.

Dr. DARBY. What do you think is the form of attachment between the tooth and the alveolus ?

Dr. YOUNGER. I think there is a great deal of what I understand to be physiological tissue and pericementum.

A MEMBER. How long do you leave your appliances on before you consider it a success or a failure ?

Dr. YOUNGER. In the course of a month or two months, if the tooth does not take hold, I take it out and put in another. If there is no attachment, of course it is a failure ; if there is attachment to the gum and the tooth simply remains loose, I consider that a success.

Dr. JACK. Here is a little box with a number of splints in it, and two teeth ready for implantation. After I have prepared my case, I keep them in a disinfecting solution and cover them until the operation is to be performed. This case has been prepared two or three weeks. The splint is to be wired fast to the tooth ; there is an arrangement of the wire which is cemented fast between the palatal cavities ; you will readily see that that form of splint makes a secure attachment in all directions.

Dr. DEANE. I want to bear testimony to the successful results obtained in a few of the cases that Dr. Jack kindly invited me to his office to see. One point that struck me is his method of retaining the tooth in the mouth. It would seem almost impossible for him to have a failure with the retaining fixture in place. I saw one case where he had just removed the fixture, and it was impossible to produce any movement of the tooth, and that was a case in which considerable pyorrhea had existed. An additional cause of trouble was that pyorrhea extended throughout the mouth, and yet this tooth was immovable and thoroughly resonant ; I could not tell which tooth had been implanted.

Dr. McQUILLEN. Dr. Jack kindly sent one of his patients over to me, and I was delighted with the result ; particularly in one case where there had been considerable pyorrhea.

Dr. JACK. When I secure suitable teeth, I preserve them in a mixture of glycerol and water, equal parts, in order to keep them moist.

Dr. REGISTER then gave a blackboard illustration of a device for maintaining uniform tension upon the driving-cord of the dental engine, which, in whatever position it was held, gave an unvarying result. The arm of the engine to which the appliance was attached was exhibited to the society.

Adjourned. GEORGE D. B. DARBY, *Secretary.*

SOUTHERN DENTAL ASSOCIATION.

(Continued from page 164.)

SECOND DAY—*Evening Session.*

THE association was called to order at 7.45 P.M. ; the president in the chair.

The chairman of the Committee on Dental Education, Dr. GORDON WHITE, announced two papers, one from Dr. W. E. WALKER, Pass Christian, Miss., and one from Dr. T. C. WEST, Natchez, Miss.

Dr. WALKER then read his paper, of which we give the following abstract :

OUGHT THE DENTIST TO BE A GRADUATE IN MEDICINE?

Having asked myself the question, "Is it not as desirable that dentists should be graduates in medicine as for other specialists?" I could not but answer in the affirmative.

The arguments in favor of this position are numerous.

I, like others who practice our specialty conscientiously, honestly endeavoring to save diseased teeth, have found it impracticable to obtain satisfactory results without also putting the surrounding tissues in a healthy condition.

The scientific treatment of the oral tissues demands no inconsiderable knowledge of general medicine ; certainly quite as much as for the treatment of the eye, the ear, or the nose.

The otologist, the rhinologist, the ophthalmologist must all be graduates in medicine. Why not the stomatologist also?

In the treatment of both the dental and the other oral tissues, it is frequently necessary to administer, both internally and hypodermically, medicaments with some of which we, as a rule, are not as familiar (in their effects upon other portions of the human system) as we should be, and as I believe we would be after taking the full medical course.

Would it not be reasonable to suppose that, with such thorough training, we would be better prepared to recognize systemic disorders through their oral manifestations? and, *per contra*, more fully realize the effects which oral diseases, and even our operations and treatment, may have upon other parts of the general system?

The study even of materia medica and therapeutics, however, is not all that is necessary to enable us to always act most wisely.

We should have a knowledge of temperaments, and for our protracted operations should be able to recognize the bearings of the temperature, and the indications of the pulse, of our patients.

Last winter I had a case which made me seriously question the legality of some of our systemic treatment. A gentleman from an adjoining town called to have a crowded abscessed lower incisor extracted. It was an acute abscess, such as would usually result in a spontaneous cure after the extraction of the tooth. In this case, however, the result was otherwise ; partly, I believe, because the alveolus being very deep and contracted, the gum-tissue closed over before repair was complete at the bottom, thus encasing some of the pus which gravitation had retained in the bottom of the socket, and partly because the patient was exposed to the worst of our unusually severe weather of last winter, 1894–95, causing him to take cold.

It not being convenient for the patient to return to my village, he called in a local physician, but finally sent for me on the third day after the extraction.

I found him with the lower third of his face very much swollen, and done up in a hot bran poultice, which he had been using, according to the physician's instructions, for twenty-eight hours. He naturally had considerable fever, to which the physician attributed the condition of the jaw.

I saved all of the other teeth, and avoided caries and necrosis, and possible serious systemic disturbance resulting from absorption of pus, by applying twelve leeches within twenty-four hours, and injecting pyrozone in the abscess (which the physician had not even opened), together with active medical treatment for a number of days, being careful not to conflict with the prescriptions of the physician for the fever.

I did not, however, succeed in preventing the abscess from opening on the chin, as the result of the hot poultice so long worn, which I had him discontinue at once, substituting a tight cold bandage.

The physician did not approve of the change, assuring the patient up to the very hour that the abscess opened under the chin that there was no danger whatever of the abscess opening on the face.

Now, I would like some one to tell me whether that physician was practicing dentistry, or whether I was practicing medicine?

I consider that I was practicing medicine, though I did nothing but what I was morally bound to do, even though I had no medical diploma, and no state medical license to give me a legal right to "practice medicine."

Every time I had to see that case I wished I had both!

It has therefore been a question in my mind as to how far our dental license entitles us to go.

Dr. Greenleaf* places *our* attitude toward this part of the question on the same basis as that of other specialists,—*viz*, *the ability to recognize that a need exists*, and says, "To obtain such an ability, it is necessary to study the fundamental principles of medicine, as one is not likely to see things of which he has no knowledge."

George T. Stevens, M.D.,† defines *the specialist* as "one who, with an equipment of a broad and liberal training in general medicine and surgical science, has brought an unusual amount of investigation and experience to a single department."

Dr. B. Holly Smith‡ has said, "As a specialty of medicine dentistry requires that its practitioners lay the foundation of their special knowledge in a knowledge of the general principles of medicine."

"History repeats itself." It is now almost a quarter of a century since Dr. G. R. Thomas used the following language in the American Dental Association:|| "I believe the time will come, *not* when every physician shall be a dentist, but when every dentist shall be a physician; or, in other words, that he shall have a thorough knowl-

---

* *International Dental Journal*, March, 1895.

† Ibid., March, 1891.

‡ DENTAL COSMOS, January, 1889.

|| Transactions American Dental Association, 1872, p. 158.

edge of all that pertains to the prevention of disease, and that he shall not be deemed qualified for the practice of his profession until he has acquired that knowledge.''

And again, in the words of Dr. A. H. Thompson,* ''In the lapse of time we will reach our ultimate destination, fusion with the medical education, which is the goal and fate of all educated specialties of human medicine. . . . This ultimate fusion seems inevitable and is not undesirable. We will then be not less dentists, but more of physicians.

''In all the pages of progress of recent years we notice that as dentists become more educated, they become more medical. They are obliged to refer to medical text-books for their knowledge of the fundamental sciences of our calling, and in becoming broader scientists they become more of physicians. It seems therefore self-evident that as a separate branch of the healing art we cannot hope long to retain our independence of the maternal medicine.''

Granting, then, that we should have a medical education and the diploma and degree to which it would entitle us, the next question is, When should we get it?

It once seemed to me that it would be desirable to obtain it simply in the regular manner, to be supplemented with special stomatological studies, as it is supplemented by special studies in other fields by other specialists, the special training to be received in an institution where all the students should be medical graduates desiring to become dentists, with the curriculum so arranged as to eliminate all that the physician has already learned of that which is included in the usual dental college course, giving only the *plus* necessary to make a dentist (or, if you please, a stomatologist) of a physician.

To satisfy myself on this point I addressed a circular letter, embodying my ideas in detail, to the deans of a large number of our dental colleges, dental departments of universities, dental departments of medical colleges, etc. To some it was necessary to write a second time, explaining myself more clearly.

The replies received were, as a rule, kind and courteous in the extreme, and were also singularly unanimous in tenor, forcing the conclusion that the plan I had outlined would not be advantageous, for, although it is the plan pursued by other specialists, *our* requirements are such that it would not answer for us, inasmuch as it would make the student several years older before beginning that *manipulative training* which is so essential in our specialty.

It is generally conceded that pianists should begin with ''finger exercises'' in early childhood, and it is believed likewise that that skillful manipulative ability, that nicety of touch, which plays such an important part in making a successful dentist, should be acquired early in life.

This objection to obtaining the M.D. prior to taking the dental course could be partially overcome by attending summer special courses between the medical college terms, though if it were possibie to arrange the lectures, and the hours for other duties, so as to combine a course at a medical college with a course at a dental college, the two constituting a complete stomatological course, requiring possibly four or five years, it would seem an ideal arrangement.

---

* DENTAL COSMOS, August, 1883.

To those who might say this is too long a time for one to spend in preparing himself for the practice of dentistry, I would reply that it is only the time that the ophthalmologist requires ; for, after spending three or four years in the medical college, one, and often two years more are spent in special studies, the only difference being that in our case the special studies and technical and practice work would be carried on simultaneously with the general course.

Another advantage of such a compound course would be, that if a student failed to develop the requisite skill and manipulative ability necessary for the successful dentist, he could at any time drop the specialty and take up the general practice. That would be better, not only for himself, but for his patients, and better for our specialty ; far better that than to be compelled to remain within our ranks for lack of ability to do otherwise.

It is poor policy to offer to a young man, as an inducement to enter our ranks, the suggestion that he can prepare himself in one or two years' less time than for other specialties. To draw from any given number of men those who would come to us *merely* because it requires a year or two less time and because there is less to learn, is not elevating to our specialty. In the words of the lamented Dr. J. W. White,* "Of one thing we are assured : the dentistry of the future is to be something more, not less, than is included in the ordinary curriculum of the medical schools,—something added, precisely as ophthalmic or aural surgery express the same general foundation and superstructure, with a story added."

As a suitable degree to indicate the completion of this compound course of medicine and dentistry,—this stomatological course,—I originate and suggest S. D.,—Stomatologiæ Doctor (doctor of stomatology),—equivalent to "mouth-doctor," the Century Dictionary definition of stomatology being "the sum of scientific knowledge concerning the mouth."

Why suggest another degree ?

Because our specialty is making such rapid strides that the D.D.S. acquired to-day implies much more learning than does the D.D.S. acquired twenty, fifteen, ten, or even five years ago, so that the patient's ideas of the capabilities of a D.D.S., while doing full justice to the earlier graduates, is an injustice to the graduate of to-day. They are apt to class all D.D.S.'s together, and exclaim when we first give them a prescription, "Are you a doctor, too ?"

And again, D.D.S. (Doctor of Dental Surgery) does not properly define either the knowledge, or the functions, of our specialty as practiced to-day, for it is not merely surgery ; medication as well as surgery, and both of all the oral tissues are necessary in order that the teeth may be placed and maintained in a healthy, comfortable condition.

"S.D." should signify not only better training in the treatment of the mouth than is implied by the "D.D.S." of years ago, but should even signify an advance over the "D.D.S." of to-day. It should imply the "M.D." with the "D.D.S.," and should give to the doctor of stomatology the same medical and legal standing as the ophthalmologist. It should not be conferred until both the "M.D." and the "D.D.S." of our present medical and dental colleges have been acquired, or at the completion of a compound "stomatological course" such as I have outlined.

---

* Dental Cosmos, May, 1878.

So long as we content ourselves with less knowledge of the general system, and the treatment of the same, just so long will the general public and the medical profession be justified in according us proportionately lower standing.

Dr. West not being present to read his paper, Dr. Walker's paper was presented for discussion.

Dr. S. W. Foster wished to commend the line of thought of the paper as tending to the elevation of the dental profession. While there can be no doubt that dentistry is one of the specialties of medicine, it is no less true that dentists, as a rule, know too little of general medicine and surgery.

While the proper treatment of the teeth demands a general knowledge of pathological conditions other than in the teeth themselves, it is a lamentable fact that the dentist is generally the poorest diagnostician of all those who claim to practice the healing art; they aim to be *practical dentists*, not theorists. In fact, in the education of our young men, less consideration is given to a theoretical knowledge of general medicine and surgery than to any other matter. The idea of a new degree is one to which I have not given any consideration, but I find in it food for study; it appeals to me as tending to the upbuilding of our profession along a line not hitherto suggested.

Dr. W. W. Westmoreland. I do not like to hear a member of our profession say that we are not competent to diagnose. As a member of the Board of Dental Examiners I know something of what our men have to know. They do know something both of general medicine and of surgery. They have to know it, or they cannot pass the examining boards. A young man just out of the dental college to-day knows more of theories than many an old practicing physician. We should be loyal to our profession, and I, for one, am proud of it.

Dr. T. M. Allen. Dr. Foster has reversed the situation. It is nearer the truth to say that medicine is a branch of the dental profession. Men of the medical profession are in greater need of a better education in dental matters. As a rule, an educated dentist knows more of general medicine than the general physician knows of dentistry. Ask the first physician you meet the number of deciduous teeth, or which is the first permanent tooth erupted, and plenty of them cannot tell you without going home and looking it up. What do they know about the embryonic development of the teeth? I think it is very well for the dentist to get the M.D. after he has taken the D.D.S., but to try and study dentistry and medicine together would give only a little smattering of both and not enough of either. It is not medical men who have made the dental profession what it is. If we go on as we have been doing, they will soon have to ask us to lend them a hand and help them out. Dentistry has had the nerve and backbone to build up a learned profession, in spite of opposition from those who should have been the first to lend a helping hand.

A young man who has been educated in the right dental college knows enough to diagnose any case that may come to him. Medical men don't know anything about dentistry, and they don't want to learn. I say stick to the D.D.S.; it means all it is intended to mean, and that is a great deal.

Dr. B. HOLLY SMITH. There is a growing disposition on the part of the medical profession to recognize the importance of dentistry. I have myself had occasion to deliver a course of lectures in a medical college on dentistry as embraced in medicine. In the medical colleges in which there are dental departments, every effort is made to have the medical students taught something of dentistry. I am not impressed with the necessity for another degree than the D.D.S. for the dentist. The dental schools of the present are not those of past years; they teach more of medicine, they go deeper into the sciences. Teachers in our schools do not read the lectures that were prepared years ago. Should they undertake to do so they would soon be pushed out. They must keep up with the trend of advanced thought if they would be in the fore-front. We are pushing forward, striving after and hoping for higher attainments.

Dr. B. B. SMITH. The dental teaching of to-day embraces the treatment of the whole mouth. The whole world understands what the D.D.S. means. My experience has taught me, as has been said, that the general physician knows less of dentistry than the dentist knows of general medicine. The dental college course of to-day includes sufficient of medical science to prepare a man to treat any case that he is capable of diagnosing. I think I should take the other side of the question, and say that a man with a dental education will make a better physician than the man with a medical education would make a dentist. Every once in a while some one wants to get up a new name that shall mean something else, but I am satisfied to be a dentist with the D.D.S. degree.

Dr. S. W. FOSTER. I would like to ask one question. We have, so to say, two classes of therapeutics,—rational therapeutics and empirical therapeutics; which of these two methods is generally followed by the dental practitioner? Is it rational medication based on a knowledge of pathological conditions, and a knowledge of rational therapeutics based on a knowledge of causes and effects? Or is it an empirical therapeutics, based on the statements read in journals and heard in discussions, that under certain conditions some one obtained good results from the use of a certain drug? We think we have a case affirming the same conditions, and we try the same method of treatment, looking for the same results. I assert the latter is the popular course. I do not wish to either condemn or excuse physicians for not knowing more of dentistry, but we, as dentists, should know more of medicine.

Dr. T. M. ALLEN. If a dentist has been properly taught all of therapeutics and materia medica that is taught in the best dental colleges to-day, he will know how to treat any case he may encounter that he knows how to diagnose. Physicians have their formula-books. A physician meets a case in which he finds certain indications of tongue, temperature, pulse, etc. He goes to a table, pulls out his formula-book, looks up his symptoms and writes his prescription. The dentist don't do that. He makes up his own prescription to meet conditions, and it is taken to a practical pharmacist, who, if he finds incompatibles, refuses to fill it, or substitutes something harmless, and calls the attention of some physician to the blunder of the dentist. The dentist should know what to use, and how to use it, and why to use it. And he must know how to diagnose from both the dental and the medical standpoint; and this he is taught in the best dental colleges.

The very school that Dr. Holly Smith represents was organized because the medical schools refused to recognize us. Its founders said, "We will make you recognize us," and now they are glad to have us to consult with; they are glad to have us deliver lectures on oral surgery, and teach them what they ought to know, but don't know.

Individually I have as good friends in the medical as in the dental profession; they call me in, and I call them in. It is quite as true that we can teach them as that they can teach us.

Dr. H. E. BEACH. We have discussed this question from every point of view, until it is old and hackneyed. We have no war against the medical profession, but it is an error to call medicine a science. I state as a fact that can be demonstrated, and proved by the lexicographers, that the practice of medicine is not a science. Properly speaking, there is but one science, and that is mathematics. When medicine can say with mathematical precision what effect a certain line of treatment will have, it will be entitled to be called scientific. If it were truly a science, then every physician in the world would prescribe the same medicine under the same conditions, and always with the same results. But medicine, as practiced to-day, is and must be largely empirical.

Dr. HERRING. I consider the paper we have just listened to as one of the best papers ever presented to this body. It should inaugurate a dental revolution, in view of its far-reaching conclusions.

What do we mean by *dental* education? "Dental education" does not include all that the student should know before he comes up for matriculation. Preliminary education is not dental education.

As civilization advances there is an ever-increasing demand for money, and the supply of dentists is greater than the demand. There is hardly a city of any respectability but has one or more dental colleges. Why? For the money there is in it. I do not believe there is any moral justification for all these dental colleges. The only remedy for the present state of affairs would be to compel every applicant for matriculation to show that he is prepared for college work either by the degree of A.M. or its equivalent. Then the degree of D.D.S. would be a prize worth coveting; an honor to the possessor. Some one has suggested an International Examining Board, but that offers no solution of the difficulty.

You cannot purify the pool when the fountain-head is foul.

You cannot compel a man to exercise mental activity if he has none, but under the present system every man expects his diploma when his time is up, and there is no reason why he should not expect it. To compel a purely literary degree seems a herculean task, but it simply means *work*, and work is needed for the elevation of dentistry to the ranks of educated men. Literary training in early youth is needed to make a properly educated dentist.

Dr. B. HOLLY SMITH. In regard to the importance of manual training, I wish to refer to a paper read by Dr. Noble, of Washington, in which he spoke of the importance of training children in the use of the left hand. Children will, as a rule, if not taught otherwise, use the left hand as naturally as the right, but they are early reproved for this and allowed to use the right hand only, until from force of habit it is used exclusively, and from disuse the left hand becomes to a great extent useless. But to the dental operator especially there is a marked advantage in being able to use the left hand equally as well as the right, and this would be much more frequently the case if it were not for mistaken training in childhood. Dr. Herring is very modest in his self-depreciation, but dentistry as a profession is not as despised as he represents it. He is pessimistic. We are leaders, not only among our patrons, but among the people.

Dr. V. E. TURNER. On the line of thought of the paper just read, it is very difficult to define just what dental education does embrace. A civil engineer is a mechanic, an educated mechanic ; a shop-worker at the bench is also a mechanic, but you do not expect him to be an educated mechanic ; and it is so in dentistry : in mechanical dentistry there are educated mechanics and there are the bench-workers, the mere mechanics. The tendency of the schools to-day is to ignore text-books ; education is not thorough ; a man takes to what he understands the most readily, with the least study, and keeps to that without being well grounded in the text-books. The colleges afford every opportunity, but they don't enforce the availing of the opportunities offered. Many young men enter the colleges who are deficient in general education. They find it difficult to understand the text-books or to follow the lectures, they don't understand the meaning of the words used, and their time is lost until the class is well along in the curriculum, but the laboratory has a fascination for them. They can see what is being done, and understand to a certain extent, and it becomes difficult to keep them away from the mechanical department. Months are lost before they learn how to learn.

I quite agree with the writer of the first paper, that it is very important for the dental colleges to place clearly before their students the value and importance of a thorough grounding in the principles of general medicine.

Dr. W. E. WALKER. If I have been understood as meaning that physicians know more about dentistry than dentists do about medicine, I have not been correctly understood. The best educated physician will know something about all parts of the system, but he does not undertake to master each part as thoroughly as do the various specialists. He could not undertake such a herculean task. We should not expect him to know as much as we do about the mouth, any more than the otologist, the ophthalmologist, or the rhinologist expect him to know all about their special fields. He does not understand these departments thoroughly, or we would not hear of these specialties. The physician, however, should know more of dentistry than he does, and we should know more of medicine. A man who has the education of the physician added to his dental education will make the best dentist, or, if you please, stomatologist.

It is a mistake to say that the entire dental profession is up to the standard which a few eminent men among us have attained ; but it is gratifying to our pride to know that there are even a few such men among us. At present I am studying medicine with a medical student, having been prevented by circumstances from completing the medical course which I began in Baltimore ; and I am continually realizing more and more what an advantage it is to have the knowledge that even a partial medical course has given me.

Dr. T. C. West. I have studied medicine somewhat, and intend to keep it up, for I realize the great advantage it gives us. But before undertaking the study of either medicine or dentistry, the mind should be cultivated to a certain extent. My position is that the average dental student is not capable, during the first year, of receiving or understanding what is taught in the dental college. I know this from my own experience. When I went to the dental college I had been in the drug business, and had not been in a school for some years. I had to learn how to listen. The other boys could take in the lectures and talk them over. I could not do it. It was not until after the first course that I really began to learn. By that time my mental faculties were aroused and developed, and I was astonished myself to find how much more I could take in and appropriate. The course was then only two years, and my first year was given to the development of my mind, and I had to accomplish in the second year all that I should have done in the two. I got through, but I don't see now how I did it.

Dr. Marshall. The ground has been so well covered that I have nothing to add. I believe, however, that the average dentist knows more of medicine than the physician does of dentistry. I have in mind a case where a child, supposed to have a tumor on the jaw, was operated on seven times during eight months. The entire trouble was due to an alveolar abscess from a dead deciduous tooth. The child was well three days after the removal of the tooth. In another case a lady was supposed to be dying from cancer—physician visiting her four times a day. The only trouble was that the duct of Wharton was stopped by tartar in the inferior teeth. When the tartar was taken off, there was no cancer.

(To be continued.)

CHESTER AND DELAWARE COUNTIES DENTAL SOCIETY.

At the annual meeting of the Chester and Delaware Counties Dental Society, held at Media, January 22, 1896, the following officers were elected to serve for the ensuing year : S. B Luckie, Chester, president ; James L. Paiste, Avondale, vice-president ; Meta T. Haley, West Chester, secretary ; H. L. Smedley, Media, treasurer. To serve with the above officers as members of executive committee : J. R. C. Ward, Wayne ; C. H. McGowan, West Chester ; J. H. Campbell, Media.

In the evening, the members, with invited guests from Philadelphia, partook of a dinner, after which a number of toasts were responded to.

The next meeting of the society will be held at Wayne, Wednesday, April 22, 1896, at 2 o'clock p.m.

Meta T. Haley, *Secretary.*

ALUMNI ASSOCIATION OF THE NEW YORK COLLEGE OF DENTISTRY.

THE annual meeting of this association was held on January 7, 1896. The following were elected officers : L. C. LeRoy, president ; J. W. Taylor and W. M. Dailey, vice-presidents ; F. T. Hannemann, secretary ; Z. T. Sailer, treasurer ; F. J. McLaren, curator ; W. D. Tenison, F. A. Chicherio, and E. Fox, executive committee.

The next regular meeting will take place March 11, at 6 Lexington avenue, New York City.

F. T. HANNEMANN, *Secretary*,
840 Lexington avenue, Brooklyn, N. Y.

DENTAL SOCIETY ANNOUNCEMENTS.

ALUMNI SOCIETY REUNION, BALTIMORE COLLEGE OF DENTAL SURGERY.

THE alumni, graduates, and friends of the Baltimore College of Dental Surgery are cordially invited to participate, at Baltimore, on March 19, 1896, in a most interesting series of clinics, and a banquet in the evening.

The clinics will be given in the college infirmary at 10 A.M., and close at 4 P.M. Some thirty of the best-known operators from New York, New Jersey, Pennsylvania, and Maryland will clinic, and all the newest phases in surgical, operative, and mechanical dentistry will be performed. Anesthesia by cataphoresis, and bleaching, with the latest electrical appliances, exhibited.

The alumni will meet from 4.15 until 5 P.M.

The banquet will be at the Café Calvert, Fayette and Calvert streets, at 6.30 P.M., with music, and responses to toasts by well-known practitioners.

Special cars attached to the Congressional Limited will leave New York, Tuesday, 3.30 P.M. Round trip, $7.48.

The Carrollton will be the headquarters, at reduced rates.

Invitations to the banquet may be obtained of Drs. Wm. S. Twilley, 309 Eutaw street; Wm. B. Finney, treasurer, 813 Hamilton terrace, and W. G. Foster, 9 W. Franklin street, Baltimore. Transportation tickets or information of Drs. F. C. Barlow, 646 Jersey avenue, Jersey City, N. J. ; C. W. F. Holbrook, Newark, N. J., and George E. Adams, South Orange, N. J.

CHAS. A. MEEKER, D.D.S., *President Alumni.*

ALABAMA DENTAL ASSOCIATION.

THE Alabama Dental Association will hold its next meeting at Hotel Albert, Selma, April 14th to 17th inclusive, 1896. The forecasts indicate a splendid meeting, and everything possible will be done from now on to bring about a realization of the same. All practitioners in good standing are very cordially invited to meet with us and participate in the proceedings. Arrangements for the usual railroad rates will be made.

The Board of Examiners will meet at the same time and place, and all who contemplate entering practice in the state should be present and clear, and the authorities will receive the hearty support of the profession in the enforcement of the law.

J. H. CROSSLAND, *Secretary*,
Montgomery, Ala.

VERMONT STATE DENTAL SOCIETY.

The twentieth annual meeting of the Vermont State Dental Society will be held at Queen's Hotel, Montreal, Quebec, Wednesday, March 18, 1896.

Thomas Mound, *Secretary*,
Rutland, Vt.

ILLINOIS BOARD OF DENTAL EXAMINERS.

The Illinois State Board of Dental Examiners will meet on Saturday, March 21, 1896, at the Sherman House, Chicago, for the examination of candidates for license, and transaction of other business. All persons wishing to be examined must send their names to the secretary at least one week prior to meeting.

L. L. Davis, *Secretary*,
1207 Columbus Memorial Building, Chicago, Ill.

◆

EDITORIAL.

CATAPHORESIS.

We have in recent issues presented our readers with a considerable amount of matter dealing with the application of the cataphoric feature of electric energy to dental therapeutics. The current number contains an elaborate exposition of the scientific principles involved in cataphoric medication by Dr. Wm. J. Morton, and we have in type a further elaboration of the subject by the same author, which for lack of space we are compelled to lay over until our April issue.

The interest which has been aroused by the results thus far reported of investigation of this subject is widespread, as is shown by the large number of letters received by the investigators and at this office, making inquiry regarding the details of use and practical utility of the cataphoric method in dental practice. When the claims put forth in favor of the method are considered, there can be little reason for surprise at the general interest manifested in its workings.

Since the origin of dentistry, some method for annulling or alleviating the pain consequent upon its procedures has been persistently sought for. Many methods and devices have been heralded to an anxiously expectant profession as the long-sought and earnestly desired nepenthe which should banish pain from dental operations. While much has been accomplished in this direction, the ultimate goal of complete local anesthesia in filling-operations under all circumstances has not been attained, unless this new candidate for high honors shall prove to be all that is claimed for it. That all methods hitherto have been more or less failures is good reason why we should proceed cautiously before accepting as finality the prophecies so freely made by investigators in their enthusiasm for this new method. On the other hand, because everything in this direction heretofore has resulted in much disappointment is no reason at all why the statement that the "era of painless dentistry is at hand" should not be accepted, if the facts prove the premises. The growth of local anesthesia as applied to the dental pulp and its dentinal fibrillæ is one which has proceeded by definite stages. Until the advent of cocain and its salts, we were practically without an agent having specific analgesic properties which might safely be applied to sensory nervous filaments without destructive action upon the tissue. That cocain and its salts may be so used is abundantly proven by their extensive and safe use in ophthalmic practice. Its efficiency as a local anesthetic wherever it is possible to bring it into contact with the sensory nervous elements of tissues is generally conceded. The barrier to the successful use of cocain salts as dentinal obtundents arises not out of the inability to produce an anesthetic impress upon the pulp itself, but because of the obstacle which the dentine opposes to the penetration of cocain solutions, thus preventing their access to the pulp. It was this single feature which relegated cocain in operations upon dentine to an inferior place as compared with its value as an obtundent of the soft tissues.

It will be seen, then, that in the first efforts at securing dentinal anesthesia we were without a specific anesthetic agent suitable for local application. When the agent was discovered, it was found impossible to secure its action upon the pulp through even thin walls of dentine, hence its value in this connection is questionable, if any. The difficulty just noted seems now to have been overcome by enlisting the cataphoric principle of the galvanic current, and the feat of causing cocain to penetrate to the pulp, producing a total anesthesia of that organ through walls of dentine having considerable thickness, is claimed to be a demonstrated fact. The significance of such a result cannot well be overestimated. If the dental pulp may with impunity be totally anesthetized by cocain for a reasonable length of time, the nervous wear and tear upon both patient and operator, which has been little short of a curse upon our work as dentists, will be almost completely removed. This is the achievement which it is claimed is now being practically worked out.

There is much yet to be determined before the method can be regarded as a practical success suitable for general acceptance. It must be conclusively shown that medication of the pulp by cataphoresis exerts no detrimental effect upon that organ, that its future integrity is in no degree jeopardized by the treatment; otherwise we shall be in no better case with respect to cataphoric cocain anesthesia of the pulp than we are with respect to anesthesia of dentine by so-called limited applications of arsenic, with the disastrous results of which the profession is sufficiently familiar.

The nature, strength, and gradations of the current used, the character of the drugs employed both as to physiological and local action, and the production of instruments especially adapted for the dental uses of the method, are all matters which will yet require much time, study, and intelligent experiment before the general use of dental cataphoresis may be safely entered upon.

There is a most important field of research and probable usefulness for the cataphoric principle in dental practice regarding which we are as yet without data,—viz, for the sterilization of pulp-canals and the tissues of the apical region. The ability to cause penetration of the dentine by pyrozone by the cataphoric method is fully demonstrated in the successful bleaching of teeth cataphorically, and, as it may be safely stated that such bleaching is equivalent to perfect sterilization, we may deduce that in cataphoresis we have the means for the absolute sterilization of dentine infected by putrefactive elements. Experimentation on this point is needed, as there can be no reasonable doubt that the means is at our command which will enable us to force sterilizing and disinfecting agents not only into the root-walls, but through the foramina into the enveloping tissues of the apex, enabling us to not only cure existing diseased conditions, but also to prevent in great measure the cases of soreness and irritation of the pericementum which without doubt arise from imperfectly sterilized dentine of the root.

The whole field of dental applications of the cataphoric principle is still in its infancy, but enough has been done thus far to encourage most diligent research for the complete realization of all the possibilities which it seems to hold out.

DR. W. H. DWINELLE.

THE death of Dr. W. H. Dwinelle occurred in Cazenovia, N. Y., on February 13th ult. This intelligence reached us too late for a more extended notice, which will appear in a later issue.

◆

BIBLIOGRAPHICAL.

AN INTRODUCTION TO PATHOLOGY AND MORBID ANATOMY. By T. HENRY GREEN, M.D., F.R.C.P., Physician and Special Lecturer on Clinical Medicine at Charing Cross Hospital, and Physician to the Hospital for Consumptives and Diseases of the Chest, Brompton. Seventh American from the eighth English edition. Revised and enlarged by H. MONTAGUE MURRAY, M.D., F.R.C.P., Physician to Out-Patients and Lecturer on Pathology and Morbid Anatomy at Charing Cross Hospital. Illustrated by 224 engravings. Pp. 595. Philadelphia, Lea Brothers & Co., 1895. Price, cloth, $2.75.

Green's Pathology has from its first publication ranked as the standard text-book on the subject. Its popularity is attested by the appearance in rapid succession of eight English and seven American editions. It is both in arrangement and style of treatment of its matter an ideal text-book. The facts and phenomena relating to morbid processes are presented in logical order, with clear scientific treatment which fastens the attention of the student and holds his interest throughout the work. As a means for acquiring a familiarity with the essential foundations of general pathology, we know of no single work which so nearly meets the requirements of the case as does this.

The new edition has been fully revised and in many parts rewritten, so that in all particulars it has been brought into harmony with the latest advances and developments of the science.

The ground which is covered by the work should be familiar to every progressive and well-informed practitioner of dentistry.

THE AMERICAN YEAR-BOOK OF MEDICINE AND SURGERY. Being a Yearly Digest of Scientific Progress and Authoritative Opinion in all Branches of Medicine and Surgery drawn from Journals, Monographs, and Text-Books of the leading American and Foreign Authors and Investigators. Collected and arranged with critical editorial comments by a numerous staff of collaborators under the general editorial charge of GEORGE M. GOULD, M.D. Profusely illustrated with numerous woodcuts in text and thirty-three handsome half-tone and colored plates. 1128 pages and index. Sold by subscription only. Price, cloth, $6.50 net; half morocco, $7.50 net. Philadelphia, W. B. Saunders, 1896.

The immense annual output of medical literature renders it impossible for the general practitioner or even the specialist in any of its departments to devote the time necessary to its perusal. He is by force of circumstances compelled to rely for his knowledge of the advances of his profession upon his limited and irregular opportunities for reading, and, as a consequence, much that would be of value to him escapes his notice.

The need for an intelligent epitome of all that is really new and valuable in the progress of medical science is one which has been long and generally felt. The effort to meet this need, in the shape of the present volume, shows how thoroughly such a work may be accomplished when intelligently organized and managed.

The object has been to preserve only those features of medical literature which during the year have marked a definite advance or which embody new suggestions. The result is one which is in the highest degree satisfactory, and will be appreciated by the busy practitioner, who has here within easy reach the desirable features presented in the whole world of medical literature during the previous year.

The distinguished list of departmental editors under the able editorial direction of Dr. Gould is an ample guarantee of the thoroughness and intelligence with which the work of selecting and separating the wheat from the chaff has been done.

OBITUARY.

STILLMAN R. BINGHAM.

STILLMAN R. BINGHAM, the manager of the Chicago Branch of The S. S. White Dental Mfg. Co., died at his home in Highland Park, Ill., February 1, 1896.

He contracted a severe cold about ten days before, but neither his physician nor his family considered the attack dangerous until about forty-eight hours before his death, when pneumonia developed, aggravated by heart complications, after which he failed rapidly until the end.

Mr. Bingham was born in the village of Morristown, Vermont, October 14, 1829. His family was of the best New England stock. He was educated in Stowe, Vt., and for a time taught school there, but relinquished the profession of teacher and with it the hope he undoubtedly had at that time of a professional life, to enter into mercantile business in New York city. In 1853 he was engaged as book-keeper in the New York branch of the house of Jones, White, & McCurdy, and he filled that position for about five years. Those were days of small things in the dental supply business, and the young book-keeper had ample time and opportunity to master all the details of the business, which he succeeded in doing most thoroughly. In 1858, when it was decided to open a branch in Chicago, Dr. Samuel S. White, with that rare and intuitive judgment of men for which he was remarkable, named Mr. Bingham as the one best qualified to take charge of the enterprise. Probably no one was more surprised at this selection than Mr. Bingham himself, but during the whole thirty-eight years that the Chicago branch has been in existence there never has been a day or an hour in which the wisdom of that choice has not been manifest.

Mr. Bingham was a man of great energy and untiring industry, of spotless integrity, and remarkable for his foresight and correct judgment. Added to these were a ready tact, a warm heart, and a sympathizing nature that won for him the esteem and affection of literally thousands, who looked to him as their sincere friend and often adviser and helper. In business matters his opinions were quickly formed, and his advice, continually sought, was promptly and frankly given in terse and convincing language. There was never any issue between him and the home office. His conduct of the business was so wise, so strictly upright and just to all, that it was impossible to take exception to it.

The career of the Chicago branch has been most successful, its progress continually upward, and the past year was the greatest in its history. It is undeniable that the largest factors of that prosperity were the ability and personality of Stillman R. Bingham.

Mr. Bingham's influence among the dentists in the territory in which his life's work was accomplished was very marked and important.

Since his death, at his late residence and at the company's office in Chicago, there have been from among the members of the dental profession innumerable callers, and showers of letters which it has not been possible to answer in detail, referring to him affectionately, with expressions of sorrow as for personal loss; many of them telling in touching language of kindly acts, of wise counsel, of material help bestowed upon them in time of need. One of these communications refers to Mr. Bingham as the writer's financial and moral saviour, and there are many others of similar tenor. It is safe to say that in matters of morals, principles, and even of the conduct of business and professional life no one of the many hundreds of young men who sought counsel from Mr. Bingham ever made a mistake by following his advice.

It was largely through his influence that the now great and important Illinois State Dental Society was formed. The same is true of the Chicago Dental Society, the meetings of which were for a long time held in the rooms of the S. S. White Dental Depot. It was mainly Mr. Bingham's arguments that decided its originators to organize in the brotherhood of a society. He was always most heartily welcomed at the meetings of these and other dental associations of Illinois and the adjacent states, and throughout the entire country now tributary to Chicago there is no name which is more widely or more familiarly known in dental circles, or which calls forth more kindly remark, than that of S. R. Bingham.

For many years he was among the best known and most highly esteemed of the business men of Chicago. Outside of his own business he was still the same kindly, patient, self-denying man, fruitful in good works. He was a liberal supporter of charities, and active in all movements of a benevolent nature or for the public weal. His private contributions in response to appeals for help were a constant drain upon his resources. He was a life-long worker in church and Sunday-schools. The Eighth Presbyterian Church of Chicago was organized in his parlor over thirty years ago, and his labors in its behalf were incessant until it was completed and self-supporting.

During the twenty-two years of his residence in Highland Park he was an Elder and earnest worker in the Presbyterian Church of that town, and was untiring in his zeal in all movements for the welfare of the community.

As a speaker he possessed remarkable gifts of oratory; he was original and humorous, and when his indignation was aroused his language was keen, incisive, and overwhelming. His logic was sure and his arguments exhaustive. These qualities characterized his writings, and many of his letters have been kept for years as choice gems by his friends, who will now hold them as beyond price.

A depth of affection existed between Samuel S. White and Stillman R. Bingham which was the most extraordinary that ever came under the writer's observation. It was not because they were associated in business or engaged in kindred pursuits. Their mutual esteem would have been as sincere and lasting if they had had no business relations, provided they had been brought into as intimate contact. They were both men of noble mold, of high and pure ideals. They were pre-eminently chaste men in thought, speech, and conduct. They had deeply religious natures. Firmly believing in a Divine Father and Guide, they desired nothing more earnestly than to know and do His will. They were gentlemen in the best sense of the word,—gentle, patient, sympathizing, self-sacrificing, with helping hands ever extended toward the suffering and fallen.

In business they had unusual energy and foresight, as the results of their labors bear eloquent testimony. They were good disciplinarians, and had the rare faculty of being able to evoke the best service of their employes, every one of whom served them gladly. So they were drawn together, and their attachment was a rare and noble instance of manly love.

Since the death of Dr. S. S. White sixteen years ago, Mr. Bingham has talked much and often to his friends of his association with his beloved "Chief," as he was wont to call him, and with a faith that never for an instant wavered he would anticipate again meeting him beyond the grave, where there is no more parting.

The management of The S. S. White Dental Mfg. Co., since the death of Dr. S. S. White, have looked to and depended upon Mr. Bingham more than upon any other one man. His forty-three years of service with the company and its predecessors was a remarkable experience, which, added to his great ability, noble character, and sure judgment, made of him an eminently wise and safe counselor. Those who are now left in the management will miss him with an increasing sense of loss as the days roll on. Personally, as well as in business relations, he was far more to them than can be expressed here.

The funeral services were held in the Highland Park Presbyterian Church, Tuesday, February 4, and were attended by a large gathering, including members of the dental profession, business men, employes, and hosts of sorrowing neighbors and friends.

Mr. Bingham married Mary, daughter of Judge John Lyman, of Vermont. The widow, three sons, and one daughter survive him. His father, Luther S. Bingham, aged nearly ninety years, is still living.

The life of Stillman R. Bingham was one of toil and cares, with many perplexities and some sad disappointments. But he was really happier than most men. He was happy in his beautiful family life ; happy in his work, and in the appreciation and affection of his business associates. He was happy in his love of nature, and he well knew the benediction which comes from self-denial for the sake of others. He rejoiced always in an unwavering Christian faith. Believing implicitly that his life was guided by the love of one who "doeth all things well," he accepted cheerfully and without complaint his cares and disappointments as a part of the discipline of life necessary to work out for him "that far more exceeding and eternal weight of glory" which he was sure is awaiting all who fight the good fight. Truly the world is better because Stillman R. Bingham lived.

Henry M. Lewis.

At a meeting of the Board of Directors of The S. S. White Dental Manufacturing Company, held Thursday, February 20, 1896, the following minute was unanimously adopted :

The Board of Directors of The S. S. White Dental Manufacturing Company, in deep sorrow, record the death of Mr. Stillman R. Bingham, the late manager of the Chicago Branch of this Company, who died of pneumonia, after a short illness, at his late residence in Highland Park, Ill., February 1, 1896.

Nearly the whole of Mr. Bingham's business life was given to the service of this Company and its predecessors. In 1853, in his twenty-fourth year, he was engaged as a clerk by Jones, White, & McCurdy, in the branch house at New York. In 1858, when the firm decided to establish a branch in Chicago, Mr. Bingham was selected for its manager, in which position he continued until his death: for Jones, White, & McCurdy until 1861; for Samuel S. White from 1861 until December 31, 1879; for the Trustees of S. S. White until July 1, 1881, and from that time for The S. S. White Dental Manufacturing Company.

His work in all these years was masterly and successful; he was most industrious and energetic; was prudent, wise, and far-seeing. The success and remarkable growth of the business of the Chicago Branch are surely due mainly to his labors, care, and foresight.

Into all the affairs of life he carried the true Christian principles of absolute purity of motives and unfaltering devotion to duty. He was inflexible in principle, wise in decision, prompt in execution, tender and kind to the suffering and erring. He was honored, esteemed, and loved as few men are.

His relations to his employes were far more than the ordinary tie of business interest: he was as a father to them; patiently teaching, guiding, and counseling them with an influence that ever tended to make them noble and good. Their floral offering at his funeral bore the words, "We loved him because he loved us," which was the fitting and spontaneous tribute of the entire force of the Chicago Branch at the time of his death.

He was an able Christian gentleman.

By his death the management of this Company have lost their wisest counselor and most efficient helper, and the officers and directors mourn him as a beloved friend.

The Board direct that this resolution be placed upon their minutes and published in the DENTAL COSMOS, and that a copy be sent to Mr. Bingham's widow and children.

The employes of the Chicago Branch House of The S. S. White Dental Mfg. Co. adopted the following:

The Almighty, in His infinite love and wisdom, having deemed it best to call from us our beloved Manager, Mr. Stillman R. Bingham, we, the employes of the Chicago House of The S. S. White Dental Mfg. Co., tender this testimony appreciative of the undeviating justice and unfailing kindness we have experienced at his hands for a period of time varying from a few weeks to thirty-nine years.

Not content with the business relations necessarily existing, Mr. Bingham has to each of us been a personal friend, ever ready to place at our service his rare judgment and valuable advice, always rejoicing with our happiness and invariably offering a sincere sympathy in our sorrows. In his death we are deprived not alone of a considerate employer, but also of a true and trusted friend.

He has passed from mortal vision, and while we know that those who had the happy privilege of a closer walk with him through life will miss the more his genial presence and kindly ways, yet he has bequeathed to them and us a mint of precious memories recalling his manly spirit and generous heart, and the light he has left behind him will brighten our paths for years to come.

To the bereaved members of his household, and all who knew and loved him, we extend our most earnest and heartfelt sympathy, with the hope that the future will find us following in his footsteps until reaching a joyous reunion in the realms of Eternal Light.

Chicago, February 1, 1896.

DR. CHARLES E. KELLS, SR.

Died, at New Orleans, La., February 1, 1896, of hepatic trouble, Dr. Charles E. Kells, Sr., in the sixty-ninth year of his age.

Dr. Kells was born in New York City, and studied dentistry with Dr. M. H. Dodge.

He had about concluded his term of studentship when the gold fever broke out, and he was one of the "forty-niners" who journeyed to California around Cape Horn. He did not remain in California long, and, traveling landward in 1850, found himself in New Orleans, where he concluded to locate.

His undoubted skill and genial manners soon won for him a practice which was not long in growing to be one of the best in the state. Among his clientele were found some of the best people in Louisiana and the surrounding states.

Ever progressive, he adopted the advanced methods of practice from year to year, and in his younger days took an active interest in dental associations.

He was a member of the Masonic Fraternity, having received the thirty-third degree. At the time of his death he was a member of the State Board of Health, upon which he served nearly twelve years.

He was the first to demonstrate the feasibility of sinking artesian wells in his section of the country, having put down personally, upon his own premises, and at great expense, the first flowing well, which task he undertook not that he required the water, but merely to demonstrate that his convictions were correct. To-day there are a hundred or more wells in New Orleans, the direct result of his successful demonstration, saving to their owners thousands of dollars yearly.

Dr. Kells was married, in 1852, to Miss Achsah Cook, of New York, who died in 1860, leaving a daughter and a son, Dr. C. Edmund Kells, Jr. In 1872 he married Mrs. S. P. Peebles, who survives him.

Dr. Kells was in active practice up to within a few months of his death.

DR. G. O. STEARNS.

Died, at New Haven, Conn., December 2, 1895, of apoplectic paralysis, Dr. G. O. Stearns, in the eighty-first year of his age.

Dr. Stearns was born at Bedford, Mass., August 30, 1815. Having early adopted dentistry as his life-work, he soon became a very successful practitioner, first at Worcester, Mass., then at Pittsburg, and finally at New Haven, Conn., where he had been long and favorably known in the profession. Failing health some four years since obliged him to relinquish active work and retire from practice. He had been for some time an inmate of the Gifford Home for Incurables, at New Haven, and died at that institution.

Dr. Stearns was married some forty years ago to Miss Mary Bolster, of Worcester, Mass., now deceased. They left no children.

HINTS, QUERIES, AND COMMENTS.

The First Suction-Plate made by Dr. James Gardett, Philadelphia, Pa.—In the February number of the Cosmos, under "Hints and Queries," etc., page 181, Dr. Haskell gives the credit of making *the first* suction-plate to Dr. Hanson, of Boston, in the year 1844. That is not correct. The suction principle for the retention of artificial dentures was discovered by Dr. James Gardett, of Philadelphia, in 1800, and thereafter was frequently used by him. (See *American Journal of Dental Science*, vol. i, new series, April, 1851, page 380.) Dr. Leonard Koecker, in an "Essay on Artificial Teeth," etc., London, 1835, page 92, speaks of it approvingly as a method in use. John Tomes ("Dental Physiology and Surgery," London, 1848, page 368) gives, as the third mode of retaining a denture, "by the pressure of the atmosphere." Many of the older writers speak of it. I recall none who claim its discovery, except Dr. E. B. Gardett, who makes that claim for his father. In the *American Journal of Dental Science*, vol. ii, June, 1842, page 267, Dr. Solyman Brown gives his opinion of it *after years of personal experience and observation*. His remarks are repeated in Maury's "Dental Surgery," translated by J. B. Savier, Philada., 1843, page 249, Dr. Brown's contributions to prosthetic dentistry having been substituted by the translator for such portions of the French writer's which were considered out of date.

As a matter of fact, atmospheric pressure was an uncertain method until the general use of plaster for impressions made possible great accuracy of adaptation, and its *general adoption* dates from the advent of vulcanite.—William H. Trueman, Philadelphia.

Pulp-Capping.—The discussion of papers before the American Dental Association reported in the Dental Cosmos for December last shows a difference of opinion on the subject of the dental pulp that is hard to account for after so many years of investigation. Dr. D. D. Smith speaks of the attempt to cap a pulp in the distal face of a lower third molar as a risk on the life of a patient. Who can tell what he means? All I ask is possible access and a healthy pulp, never suspecting locality having anything to do with any risk on the life of a patient. And, again, he asks, Who would attempt capping in a lateral incisor or bicuspid where the cavity is shallow and circumscribed? I certainly did so twenty-four years ago, where the cement capping was the most prominent point when I began the gold filling, in retaining points at a proper distance from the point where pulp had been exposed and bled.

I believe that Dr. J. Taft will remember that contributors to the *Dental Register* exhibited much feeling at that time in denying that such practice could be made successful. To the more intelligent of my patients, who saw the pulp bleed in their own teeth and saw me apply the cement capping and follow with the gold, I have shown these denials of the possibility of success years after the work was done, and their intelligent comment on the matter would have interested the last meeting of the American Dental Association.—W. E. Driscoll, Manatee, Fla.

Solder for Platinum Crowns or Bridges on which Porcelain is Fused.—The addition of a few grains of platinum to pure gold makes a solder upon which pure gold will readily flow. Upon small work it is well within the compass of the laboratory blow-pipe, and I find it, on account of its high fusing, rather safer in the porcelain furnace.—William H. Trueman.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

The abbreviations of titles used are those common to bibliographical work, and will, it is presumed, be readily comprehended by any one familiar with dental or scientific publications. Any explanation will be gladly furnished by the compiler. A star (*) indicates a Thesis.

Beltrami (Edouard.) L'articulation alvéolo-dentaire chez l'homme. Paris, 1895, J. B. Baillière et fils, 120 p. 8°.

Bruneau (J.) Hygiène pratique de la bouche et des dents. Paris, 1896, Soc. d'éd. scient., viii, 116 p. 16°.

Dentz (Th.) Het tegenwoordig standpunkt der tandheelkunde. Paris, 1895, C. Ash et fils, 40 p. 8°.

Eyssautier. Distribution geographique de la carie dentaire en France. Grenoble, 1895, veuve Rigaudin. 8°.

——— Rapport sur le fonctionnement de l'inspection dentaire des écoles de la ville de Grenoble et de la clinique dentaire gratuite. Grenoble, 1895, imp. Allier. 8°.

Gautrand (Ulysse.) * Du chimisme salivaire: étude critique. Lyon, 1895, A. Rey, 87 p. 4°.

Heath (Christopher.) Lésions et maladies des machoires. Traduction de G. Darin. Paris, 1895, C. Ash et fils. 8°.

Neustadt (Manasse.) * Die Neuralgien und Neurosen des Gesichte und des Koppfes, hervorgerufen durch pathologische Zustände der Zähne. Bonn, 1895, J. Bach Wwe., 28 p., 1 l. 8°.

Neyraud (Joseph.) * Etude comparative sur l'éther et le chloroforme dans l'anésthesie générale d'après les travaux récents. Lyon, 1895, Imp. nouvelle, 80 p. 4°.

Pedley (R. Denison.) The diseases of children's teeth, their prevention and treatment. London, Philadelphia, 1895, J. P. Segg, S. S. White Dental Mfg. Co., 268 p. 8°.

Quilliot (Victor-Désiré-Joseph.) * Polyarthrite alvéolo-dentaire. Lille, 1895, imp. Vandroth-Fauconnier, 67 p. 4°.

Reboulet (Claude.) * Contribution à l'étude du traitement de la pulpe dentaire exposée. Lyon, 1895, A. Rey. 80 p. 4°.

Albrecht (A.) Todesfall in der Lachgasnarkose. Zahnärztl. Wchnbl., Hamburg, 1895, ix, 221.—**Amoedo** (O.) Contribution à l'étude de l'implantation: consolidation de quatre dents implantées. Odontologie, Par., 1895, 2. s., ii, 671-673.—**André** (C.) Un nouvel anesthésique local, le gaïacol. *Ibid:* 673-676.—**Arslan** (Y.) Contribution statistique à l'étude des végétations adénoïdes du rhinopharynx. Ann. d. mal. de l'oreille, du larynx [etc.], Par., 1895, xxi, pt. 2, 509-519.—**Black** (G. V.) The effect of oxidation on cut alloys for dental amalgams. Dental Cosmos, Phila., 1896, xxxviii, 43-48.—**Broca** (A.) Traitement des fissures congénitales de la lèvre supérieure et du palais. Gaz. hebd. de méd., Par., 1896, xliii, 37-42.—**Brown** (E. P.) Porcelain bridge work: some cases on record. Ohio Dental J., Toledo, 1896, xvi, 1-7.—**Brown** (H. M.) A bloodless method of operating on the floor of the mouth. Railway Surg., Chicago, 1895-6, ii, 391-393.—**Bryson** (W. A.) & **Ezard** (H. B.) A lecture-demonstration on electric energy and its applications to dental surgery. J. Brit. Dent. Ass., Lond., 1895, xvi, 748-757.—**Cassil** (B. W.) Systemic medication for the relief of sensitive dentine. Am. J. Dent. Sc., Balt., 1896, 3. s., xxix, 403-406.—**Cecconi** (L.) Application des doubles plaques métalliques sans soudure en prothèse dentaire. Odontologie, Par., 1895, 2. s., ii, 676-678. **Chupein** (T.-F.) Questions et résponses pour les étudiants dentistes. Progrès dent., Par., 1895, xxii, 328.—**Clarke** (J. J.) Observations on cocaine anæsthesia. Lancet, Lond., 1896, i, 159.—**Colyer** (S.) Alveolar abscess. Dental Rec., Lond., 1896, xvi, 10-16.—**Combe** (A.) & **Dubousquet-Laborderie.** Calcul très volumineux de l'amygdale gauche. Tribune méd., Par., 1896, 2. s., xxviii, 46-50.—**Conner** (P. S.) Operative treatment of cancer in various localities: lip, tongue, floor of mouth and pharynx. Tr. Am. Surg. Ass., Phila., 1895, 44-50. [Discussion], 96-102.—**Cool** (R. H.) The relations of materia medica and therapeutics to stomatology. West. Dent. J., Kansas City, 1896, x, 1-8.—**Coulon** (G.) Accidents de dentition simulant une attente

de méningite. Méd. inf., Par., 1895, ii, 681-686.—**Coulter** (J. H.) Empyema of antrum. Med. Age, Detroit, 1895-6, xiv, 40-43.—**de Croess.** Sonde à double courant pour le traitement des abcès du sinus maxillaire. Odontologie, Par., 1895, 2. s., ii, 728-730.—**Cryer** (M. H.) Studies of the maxillary bones. Dental Cosmos, Phila., 1896, xxxviii, 1-33.—**Custer** (L. E.) Electric heat in dental practice. Internat. Dent. J., Phila., 1896, xvii, 1-9. ——— Water rheostat for controlling electrical appliances. Ohio Dental J., Toledo, 1896, xvi, 7-10.—**Dalby** (C. B.) The six-year molar. Brit. J. Dent. Sc., Lond., 1895, xxxvii, 1117-1121.—**Death** during the administration of pental. Dental Rec., Lond., 1896, xvi, 35.—**Deaths** under anæsthetics [Cases]. Brit. M. J., Lond., 1895, i; ii, *passim.* ——— *Also;* Lancet, Lond., 1895, i; ii, *passim.*—**Deléarde** (A.) Contribution à l'étude de l'actinomycose. Rev. biol. du nord de la France, Lille, 1894-5, vii, 364; 401, 3 pl.—**Died** in a dentist's chair [Case]. Am. J. Dent. Sc., Balt., 1896, 3. s., xxix, 418-420.—**Dubois** (P.) De l'organisation des écoles dentaires en province. Odontologie, Par., 1895, 2. s., ii, 705-716.—**Dunogier.** La réglementation de l'art dentaire en France et particulièrement à Bordeaux jusqu' à en 1892. *Ibid:* 716-726.—**Fischl** (A.) Ueber locale Anästhesie mit Kelen (Aethylen Chlorid der kleinen Chirurgie). Wien med. Presse, 1895, xxxvi, 196.—**Fletcher** (M. H.) Chairman's address. [Section on dental and oral surgery.] J. Am. M. Ass., Chicago, 1896, xxxvi, 149-151.—**Fogg** (Isaac S.) [1838-95.] (Obituary.) Dental Cosmos, Phila., 1896, xxxviii, 98.—**Foucher.** Anomalie de l'artère pharyngienne ascendante. Union méd. du Canada, Montréal, 1896, xxv, 17-19.—**Gay** (G. W.) Circumstances under which chloroform is preferable to ether as an anæsthetic. Tr. Am. Surg. Ass., Phila., 1895, xiii, 177-188.—**Grimbert & Choquet.** Sur la présence du coli-bacille dans la bouche de l'homme sain. Bull. et mém. Soc. de thérap., Par., 1895, 240-242.—**Gudex** (V. A.) Misconceptions in the pathology of rheumatism. Dental Rev., Chicago, 1896, x, 34-39.—**Haderup.** Ueber dentale und palatale Sprachstörungen. Zahnärztl. Wchnbl., Hamburg, 1895, ix, 148.—**Hahl** (G.) Ueber Resektionen am Unterkiefer und dessen Prothese. *Ibid:* 139.—**Harlan** (A. W.) Coagulation. Dental Rev., Chicago, 1896, x, 44-47.—**Hepburn** (D.) Inaugural address. [Odontological Society of Great Britain.] Brit. J. Dent. Sc., Lond., 1895, xxxvii, 1105-1112.—**Hewett** (A. C.) Anæsthesia, local and general. Dental Rev., Chicago, 1896, x, 1-18.—**Hivert.** Observation d'un cas d'angine de Ludwig. Rev. odontol., Par., 1895, xxx, 532-534.—**Hodgkin** (E. S.) Abscess der Kieferhöhle. Zahnärztl. Wchnbl., Hamb., 1895, ix, 192.—**Ibbotson** (J. S.) & **Byers** (W. G. M.) Irritative or reflex trismus. Dental Cosmos, Phila., 1896, xxxviii, 58-61.—**Jean** (F.) Appareils à bourrelet creux. Odontologie, Par., 1895, 2. s., ii, 669-671.—**Jenison** (M. G.) Photography in dentistry and medicine. Ohio Dental J., Toledo, 1896, xvi, 12-15.—**Johnson** (C. N.) A method of anchoring large contour fillings in incisors. Dental Rev., Chicago, 1896, x, 19-23.—**Knight** (C. H.) Cyst of the maxillary sinus. N. York M. J., 1896, lxiii, 41-43.—**Koplik** (H.) An interesting and rare accident of dentition resulting in abscess of the tooth-sac. Arch. Pediat., N. Y., 1895, xii, 927.—**Legueu & Marien.** Tuberculose des glandes salivaires. Compt. rend. Soc. de biol., Par., 1895, 10. s., ii, 855.—**Lund** (H.) Two cases of adenoma of the palate. Brit. J. Dent. Sc., Lond., 1896, xxxix, 43-45.—**McBurney** (C.) Removal of lower jaw. Tr. Am. Surg. Ass., Phila., 1895, xiii, 508.—**Magitot** (E.) Phosphorisme et nécrose: le cas de Rose Cayol, de Marseille. Rev. odontol., Par., 1895, xxx, 540-546.—**Markle** (A. M.) A case of implantation under hypnotic influence. Dental Rev., Chicago, 1896, x, 66.—**Miller.** On the translucent zone. J. Brit. Dent. Ass., Lond., 1895, xvi, 770-773.—**Miller** (L. H.) Congenital double fistula of the lower lip simulating a supernumerary nose. Med. Rec., N. Y., 1896, xlix, 87.—**Morton** (W. J.) Guaiacol-cocain cataphoresis and local anesthesia; a new cataphoric electrode and the Wheeler fractional volt selector. Dental Cosmos, Phila., 1896, xxxviii, 48-53.—**Moty** (F.) Hygiène dentaire usuelle et examen de la denture. Arch. de méd. et pharm. mil., Par., 1895, xxvi, 457-487.—**Mudd** (H. H.) Surgery of the mouth and tongue. Syst. Surg. (Dennis), Phila., 1895, iii, 123-156.—**Nachod** (F.) Harnbefunde nach Chloroformnarkose. Arch. f. klin. Chir., Berl., 1895, li, 646-682.—**Naden** (P. T.) Presidential address. Dental Rec., Lond., 1896, xvi, 5-10.—**Nichol** (M.) Fracture of the maxillary tuberosity during the extraction of a second molar tooth. Brit. J. Dent. Sc., Lond., 1896, xxxix, 25-28. ——— Ptosis of dental origin. *Ibid:* 23-25.—**Owen** (E.) The operative treatment of cleft palate. Lancet, Lonn., 1896, i, 20-23.—**Palmer** (S. B.) Dental science, then and now. Dental Cosmos, Phila., 1896, xxxviii, 73-85.—**Nehring** (A.) Ueber einen fossilen Menschenzahn aus dem Diluirum von Taubach bei Weimar. Verhandl. d. Berl. Gesellsch. f. Anthrop., 1895, (338-340).—**Ottofy** (L.) The protection of the cervical border in proximate cavities. Dental Rev., Chicago, 1896, x, 23-27.—**Pearsall** (W. B.) Moufle pour moulage au sable. Progrès dent., Par., 1895, xxii, 341-344.—**Peclet.** Ecarteur ouvre-bouche. Odontologie, Par., 1895, 2. s., ii, 678.—**Pettyjohn** (E. S.) Successful transplantation of teeth and chloroform anæsthesia during sleep. Med. Rec., N. Y., 1896, xlix, 16.—**Poncet** (A.) Note sur une nouveau cas d'actinomycose temporo-maxillaire; considérations cliniques. Lyon méd., 1895, lxxx, 519-530.—

Popowsky (I.) Zur Entwicklungsgeschichte des N. facialis beim Menschen. Morphol. Jahrb., Leipz., 1895, xxiii, 329-374, 3 pl.—**Porak.** Observation d'une lésion parasitaire non décrite de la langue chez le nouveau-né. Bull. et mém. Soc. obst. et gynéc. de Par., 1895, 447-452.—**Porter** (C. B.) Diseases of the salivary glands. Syst. Surg. (Dennis), Phila., 1895, iii, 157-168.—**Robinson** (C. H.) Our relations to the dentist of the future. Dental Rev., Chicago, 1896, x, 39-44.—**Rose** (H.) Plate work. Brit. J. Dent. Sc., Lond., 1895, xxxvii, 1112; 1896, xxxix, 7.—**Roughton** (E. W.) Tumors of the palate. *Ibid:* 1896, xxxix, 1-6.—**Sartirana** (T.) Un caso di resezione endocranica del nervo mascellare inferiore per nevralgia rebelle. Gazz. med. di Torino, 1895, xlvi, 957-965.—**Satterini** (G.) La lingua nella sifilide terziaria. Gazz. med. ital. lomb., Milano, 1895, liv, 459-462.—**Savill** (T. D.) On an outbreak of peri-oral eczema in the East end of London. Lancet, Lond., 1896, i, 9-15.—**Schreiber** (M.) Ueber die Beziehungen von Krankheitserscheinungen auf der äusseren Haut zu denen der Mundschleimhaut. Zahnärztl. Wchnbl., Hamburg, 1895, ix, 219.—**Schreier** (E.) Einige Bemerkungen zur Wurzelbehandlung mit Kalium-Natrium. *Ibid:* 200; 211.—**Sinell.** Ein Beitrag zur Bromaether-Narkose. *Ibid:* 220.—**Snyder** (J. B.) Implantation of tubed tooth. Ohio Dental J., Toledo, 1896, xvi, 10-12. —**Sparks** (R. E.) Caries of jaw from impacted wisdom tooth. Am. J. Dent. Sc., Balt., 1896, 3. s., xxix, 420.—**Stévenin.** Les pharmaciens doivent-ils exécuter les ordonnances des dentistes? Odontologie, Par., 1895, 2. s., ii, 726-728. [Discussion], 730-733.—**Stowell** (S. S.) The law of prevention *vs.* the law of cure. Dental Cosmos, Phila., 1896, xxxviii, 54-58.—**Straub** (M.) Tic facial door operatie genesen. Nederl. Tijdschr. v. Geneesk., Amst., 1895, 2. R., xxxi, pt. 2, 1174-1176.—**Sutton** (J. B.) Diseases of the jaws. Syst. Surg. (Treves), Lond., 1895, i, 923-945.—**Tiffany** (L. McL.) Surgical diseases of the jaws and teeth. Syst. Surg. (Dennis), Phila., 1895, iii, 365-390.—**Townsend** (J. C.) Progressive dentistry. Internat. Dent. J., Phila., 1896, xvii, 17-23.—**Vallas.** De la pharyngotomie trans-hyoïdienne. Province méd., Lyon, 1896, x, 13.—**Vaughan** (G. T.) Anæsthesia as produced by Schleich, of Berlin. Virginia M. Month., Richmond, 1895-6, xxii, 1045-1047.—**Virchow** (R.) Halber menschlicher Oberkiefer mit Milchgebiss aus einer Höhle von Nabresina. Verhandl. d. Berl. Gesellsch. f. Anthrop., 1895, 340-342.—**Viron** (L.) Des modifications de la matière médicale à travers les siècles. Rev. odont., Par., 1895, xxix, 514-523.—**Walker** (W. E.) Prosthetic dentistry; the glenoid fossa; the movements of the mandible; the cusps of the teeth. Dental Cosmos, Phila., 1896, xxxviii, 34-43.—**Weeks** (E. B.) Preparation of cavity margins. Dental Rev., Chicago, 1896, x, 47-49.—**White** (John De Haven.) [1815-95.] (Obituary.) Internat. Dent. J., Phila., 1896, xvii, 63. —— *Also:* Dental Rev., Chicago, 1896, x, 74.—**Wiborg** (H. B.) Electricity as adapted to dental science. Dental Rev., Chicago, 1896, x, 27-39.—**Winckler** (G. H.) Treatment of acid conditions of the mouth by kreosotum. Ohio Dental J., Toledo, 1896, xvi, 20.—**Wine** (W. B.) A case of cancrum oris following capillary bronchitis; death. Med. Rec., N. Y., 1896, xlix, 88.—**von Zoege-Manteuffel** (W.) Ueber Spättodesfalle nach Narkose. St. Petersb. med. Wchnschr., 1895, n. F., xi, 421-423.

LIST OF UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING JANUARY, 1896.

January 7.—No. 552,514, to R. M. CHIVERS. Dental disk-holder.
" " No. 552,625, to WM. M. SPEAKMAN. Dental disk-carrier.
" " No. 552,669, to J. T. PEDERSEN. Dental hand-piece.
" " No. 552,693, to O. P. MYERS. Dental mouth-mirror support.
" " No. 552,697, to C. J. PETERSON. Dental matrix.
" *14.*—No. 552,901, to J. K. GAILEY. Inhaler.
" " No. 553,042, to FRANK RITTER. Dental chair.
" " No. 553,124, to C. A. MEISTER. Angle attachment.
" *21.*—No. 553,394, to C. A. DAVIS. Tooth-crown attachment.
" " No. 553,451, to J. W. DENNIS. Absorbent for amalgam fillings.
" *28.*—No. 553,523, to A. L. and B. F. GILMER. Artificial teeth.
" " No. 553,572, to F. H. STAFFORD. Dental light and heater.
" " No. 553,610, to H. FALKENSTEIN. Toothpick.
" " No. 553,718, to J. B. MONFORT. Dentist's cap-crown slitter.

THE

DENTAL COSMOS.

VOL. XXXVIII. PHILADELPHIA, APRIL, 1896. NO. 4.

ORIGINAL COMMUNICATIONS.

ON THE FORMATION AND STRUCTURE OF DENTAL ENAMEL.*

BY J. LEON WILLIAMS, D.D.S., L.D.S., F.R.M.S., LONDON, ENG.

(The substance of this series of papers was read before the Royal Society of Great Britain on December 12, 1895.)

(Continued from page 127.)

In a paper read before the "World's Columbian Dental Congress" in 1894 Dr. Andrews, in speaking of the presence of calcoglobulin in the ameloblasts, says, "I am convinced that these minute, refractive bodies are calcospherites that are taken by the enamel-cells and excreted from them when, by coalescing, they form larger globules, and these form the rods." I can indorse all of this statement except the closing words. I believe the calcospherites are taken into the ameloblasts from the stratum intermedium, and I am able to show that they coalesce in the enamel-cells until they sometimes form spherical bodies very much greater in diameter than an enamel-rod. This one fact is quite sufficient to demonstrate that the enamel-rods are not built up by the deposit of this substance. Again, Dr. Andrews, in describing the result of Dr. Graf Spee's investigations and in comparing the results of these investigations with his own work, says, "Great numbers of them (the calcospherites) are collected at the periphery (of the ameloblasts) and appear here to be completely merged or to be fused together. The lower part of the cell contains the larger 'enamel-drops,' which merge without sharp boundaries into the substance of the enamel-rods." This, acccording to my observation, describes with sufficient accuracy the *formation* and *distribution* of the masses of calcoglobulin. But I shall, I think, be able to show conclusively that this description completely fails to explain the formation and structure of the enamel-rods.

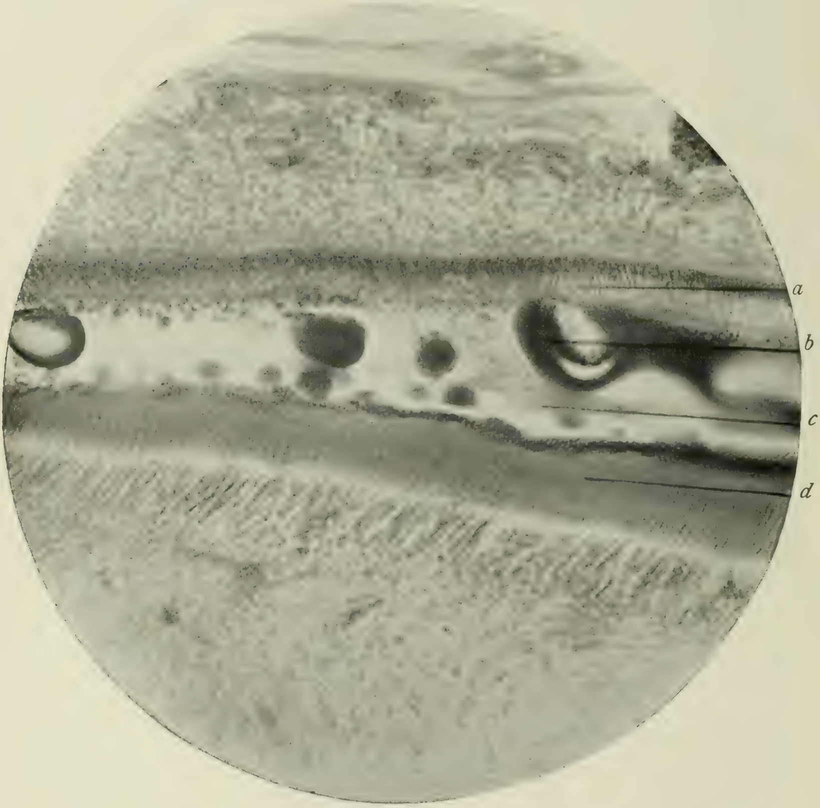
The position taken up by the late Sir John Tomes and also by

---

* Copyright, 1896, by J. LEON WILLIAMS.

Mr. Charles Tomes was, at the least, consistent. The theory that the cell-wall of the ameloblast may be calcified to form the interprismatic substance while the cell-contents solidify into the enamel-rod proper is an intelligible one. But we entirely fail to comprehend how so diverse and varied structures as the different forms of enamel with rods, varicosities, and interprismatic substance, can appear in an apparently homogeneous substance. Heitzmann and Bödecker, recognizing the inadequacy of the generally received explanation of enamel formation, invented or applied the theory that the ameloblasts break up into "embryonal corpuscles" which become calcified as the enamel-rods. This theory would have furnished a very plausible explanation of the problem, only unfortunately it happened to have no foundation in fact.

FIG. 32.

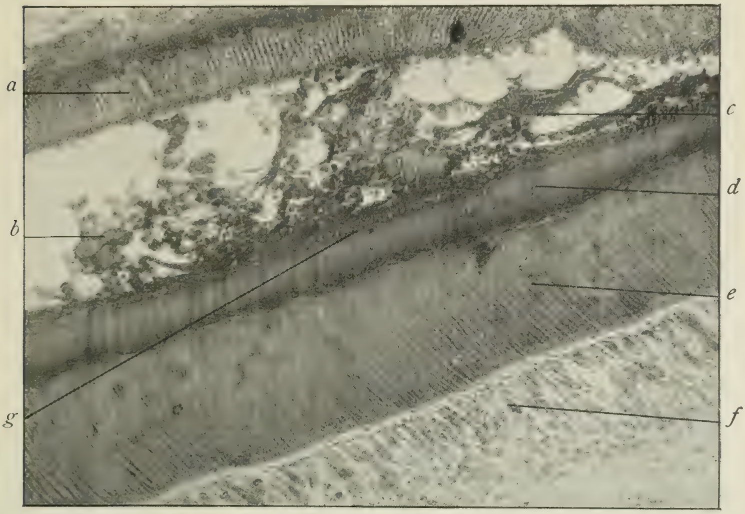


SECTION OF DEVELOPING TOOTH OF EMBRYO LAMB. × 150. ACID TREATMENT.

a, Ameloblasts; *b*, Masses of partially decalcified enamel, stained by osmic acid; *c*, Granular stroma unaffected by osmic acid; *d*, Dentine.

The various appearances presented by embryonal enamel which has been subjected to acid treatment was the first step toward the conclusions which I have been able to reach. These appearances

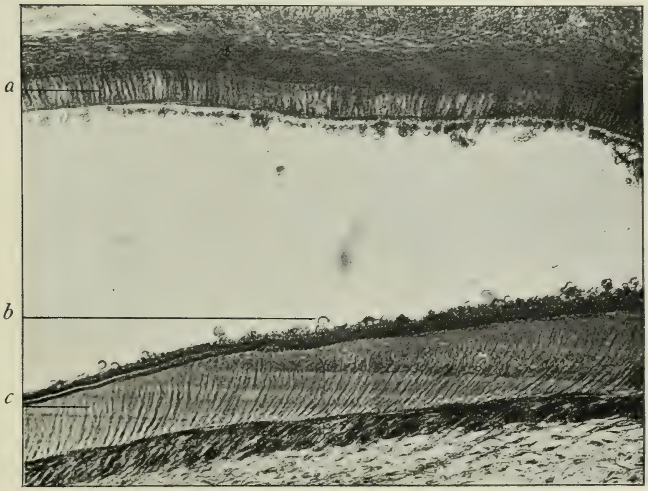
FIG. 33



SECTION OF DEVELOPING TOOTH OF EMBRYO PIG. × 150. ACID TREATMENT.

a, Ameloblasts; *b*, Spherical masses, probably calcoglobulin; *c*, Substance resembling fibrin, presenting a shredded, laminated, and fibrous appearance; *d*, Undecalcified enamel; *e*, Dentine; *f*, Odontoblasts; *g*, Small globular bodies of uniform size at the ends of the enamel-rods.

FIG. 34

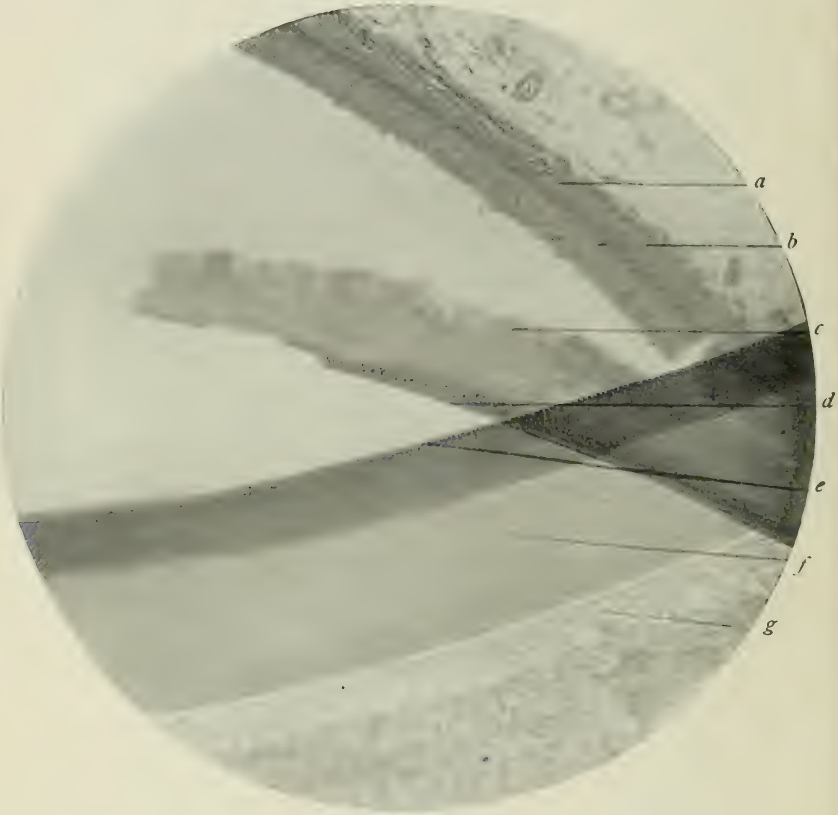


SECTION OF DEVELOPING TOOTH OF EMBRYO PIG. × 125. ACID TREATMENT.

a, Ameloblasts torn away from the narrow band of first formed enamel at *b*; *b*, Enamel-globules and masses of calcoglobulin; *c*, Dentine.

clearly demonstrated the important, I may say the necessary primary fact that enamel-formation is not the result of the deposition of a single product of the enamel-organ. Both slow and rapid decalcification methods were adopted. I would in this connection again emphasize the importance of making use of a great variety of methods in the study of so difficult a subject. Almost every different method adopted is certain to produce a greater or less modification of conclusions previously reached. The broad general mental picture which is formed by the study of specimens prepared in one or two ways becomes more and more filled in with minute details as the experience gained by the use of many methods is extended.

Fig. 35.



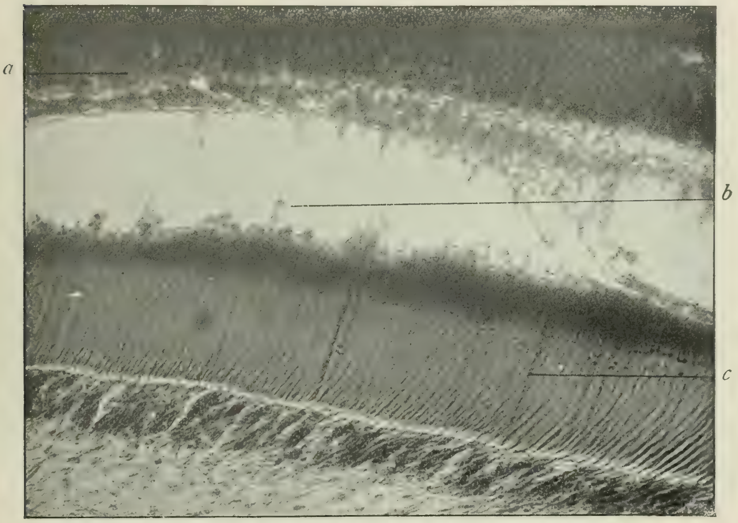
Section of Developing Tooth of Embryo Lamb. × 150. Acid Treatment.

a, Stratum intermedium ; *b*, Ameloblasts ; *c*, Granular stroma torn away from the ameloblasts at *b* ; *d*, Enamel from which the lime-salts have not been entirely removed ; this part has been torn away from the enamel at *e* ; *e*, Enamel stained by osmic acid and logwood ; *f*, Dentine ; *g*, Odontoblasts.

If a section cut from a developing tooth which has been fixed in Hermann's or Fleming's solution and decalcified in a very weak solution of chromic and nitric acid be examined under a power of 150 diameters, we shall see such appearances as are shown in Fig. 32.

Masses of an albumen-like material are observed mingled with a finely granular substance. The deeply stained masses represent enamel which still retains some portion of its lime-salts. I believe that the thin sheet of granular substance also contains some calcific material, as it slowly disappears if the action of acid fluids be continued for a sufficient length of time. We thus see that even in embryonal enamel the small amount of organic material is so intimately associated with the mineral substances that the complete removal of the latter destroys all trace of structure. In this respect the enamel-formation seems analogous to the complete fossilization of vegetable structure. An organic matrix is first formed, into which calcific material is deposited. Then, either by substitution of position or by atomic change, the organic material disappears, but leaving in the mineral substance an exact picture of its structural arrangement. Decalcification brings various phases of this structural arrangement more clearly into view. Erroneous opinions, however, would be unavoidable if careful study were not made of enamel untouched by acids.

FIG. 36.



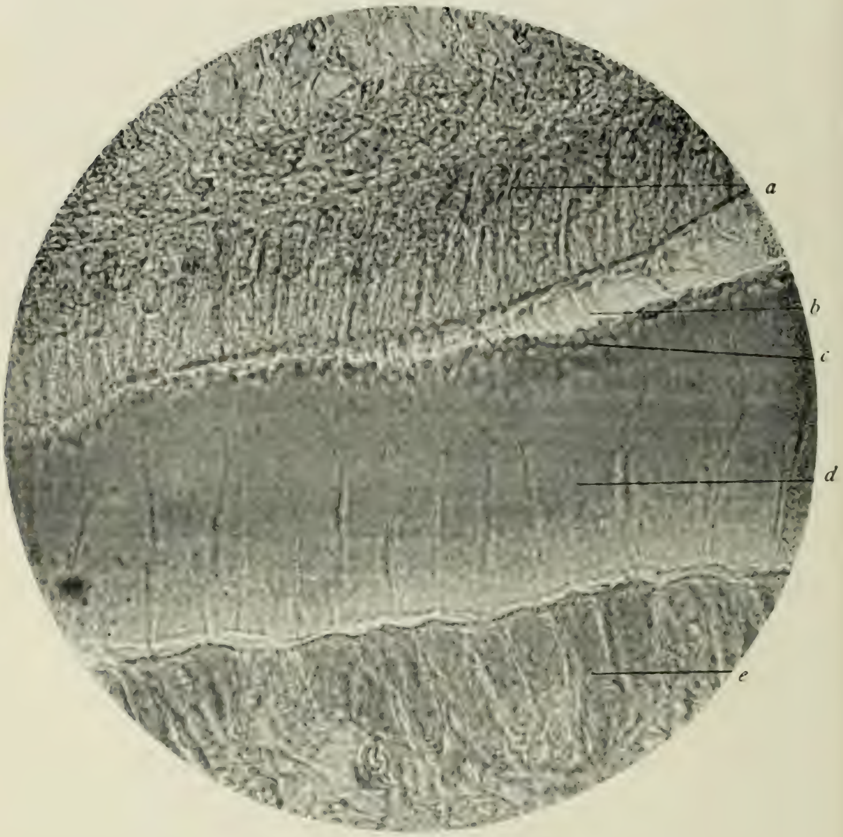
SECTION OF DEVELOPING TOOTH OF EMBRYO PIG. × 150. ACID TREATMENT.

a, Ameloblasts; *b*, Showing that the Tomes processes are formed by drawing out strings from the albumen-like substance of calcoglobulin; *c*, Dentine.

It is to be understood that in Fig. 32, and in several of the following illustrations, the ameloblasts are considerably farther removed from the dentine than before decalcification. The space between the enamel-forming cells and the dentine has been considerably increased by pressure upon the cover glass in mounting.

The material from which the section shown in Fig. 33 was cut was taken from the same jaw as that shown in Fig. 32, but the decalcification process was arrested somewhat earlier. The field shown is nearer the tip of the tooth, where the formation of dentine and enamel was in a more advanced state. Here again we perceive an albumen-like material, but in this specimen it presents a laminated, shredded, or fibrous appearance. Intermingled with this there are seen globular masses of varying size. If one look closely, especially with the aid of a good reading-glass, at the line which separates the shredded and torn decalcified enamel from that inner portion retaining its normal structure (shown at *g*), one sees smaller globular bodies at the outer ends of the enamel-rods all along this line. These bodies are seen to be of uniform size. A curious fact concerning this albumen-like material seen in partially decalcified or in recently formed enamel is that it nearly always responds to stains in the same way as do the contents of the neighboring blood-vessels. For instance, in specimens of developing teeth fixed in Fleming's solution and double stained with Grenacher's borax,—carmine and sulfindigodate of soda,—the outer layers of enamel are deeply stained a warm blue, and the blood-vessels surrounding the enamel-

Fig. 37.



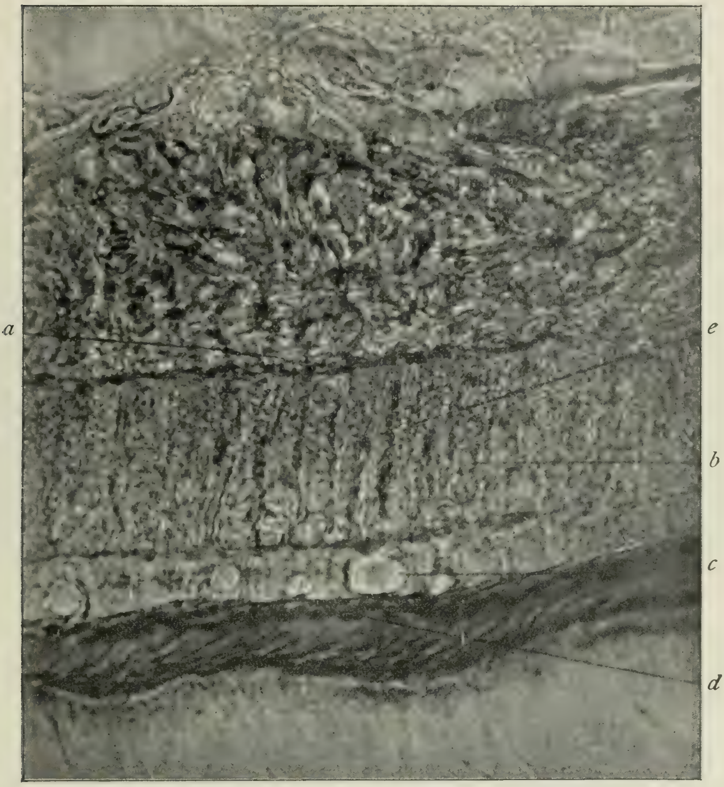
Section of Developing Tooth of Human Embryo. × 1000.

a, Ameloblasts; *b*, Tomes processes; *c*, Enamel-globules; *d*, Dentine; *e*, Odontoblasts.

organ are of precisely the same color. Another significant fact is that after the removal of this albumen-like material the finely granular substance remaining is of exactly the same color as the contents of the enamel-cells.

If, in a specimen subjected to somewhat stronger acid treatment, the ameloblasts be torn away from the forming enamel, we may often see such appearances as are shown in Fig. 34. Lying along the inner ends of the ameloblasts and on the torn edge of the enamel we see globules or droplets of a clear and apparently homogeneous substance. Where these droplets melt into the forming enamel they are deeply stained.

FIG. 38.



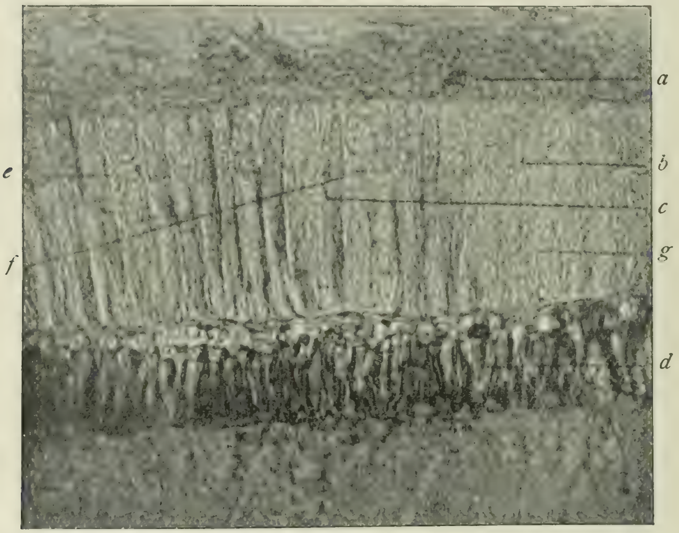
SECTION OF DEVELOPING TOOTH OF EMBRYO LAMB. × 800.

a, Probably spherical masses of calcoglobulin passing through outer ameloblastic membrane; *b*, Enamel-globules; five or six may be seen in this cell; *c*, Spherical masses of calcoglobulin showing great variation in size; *d*, Formation of enamel-rods by deposit of enamel-globules; *e*, Calcospherites or minute masses of calcoglobulin.

Material fixed in corrosive sublimate, partially decalcified in a weak solution of hydrochloric acid and stained with the Ehrlich-Biondi fluid, gave results as shown in Fig. 35. Here the albumen-like material which we saw in irregular masses in Fig. 32 seems to have been very evenly removed from the outer portion of the forming enamel, leaving behind a stroma which, on close examination, is seen to be composed of finely granular globular bodies of nearly uniform size. Here again, if we look along the border of the undecalcified enamel at *e*, where the band *d* has been torn away, we shall see a row of these bodies at the termination of the enamel-rods. In slow decalcification of the enamel we always see, according to my experience, just at the point where the enamel-rod is breaking down under the action of the acid, a row of these bodies.

An instructive picture with reference to the nature of the Tomes processes is shown in Fig. 36. Here, as in Fig. 34, the albumen-like material seems to be most in evidence. The ameloblasts are raised from the developing enamel and, projecting into the space thus formed, we see strings of the albumen-like material which sometimes extend quite across the clear part of the field. In several places these strings are seen to be drawn out from the transparent droplets. Whether these strings be drawn out from the interior of a calcifying enamel-rod, as described by Mr. Charles Tomes, Dr. Graf Spee, and others, or are merely an extension of one of the transparent droplets, as shown in Fig. 36, they are evidently always produced by the same material and substantially in the same manner, viz : by the drawing out or extension of an albumen-like product of the enamel-organ. These strings or processes are often quite as marked (as was shown by Dr. Sudduth twelve or thirteen years ago) at the very commence-

FIG. 39.

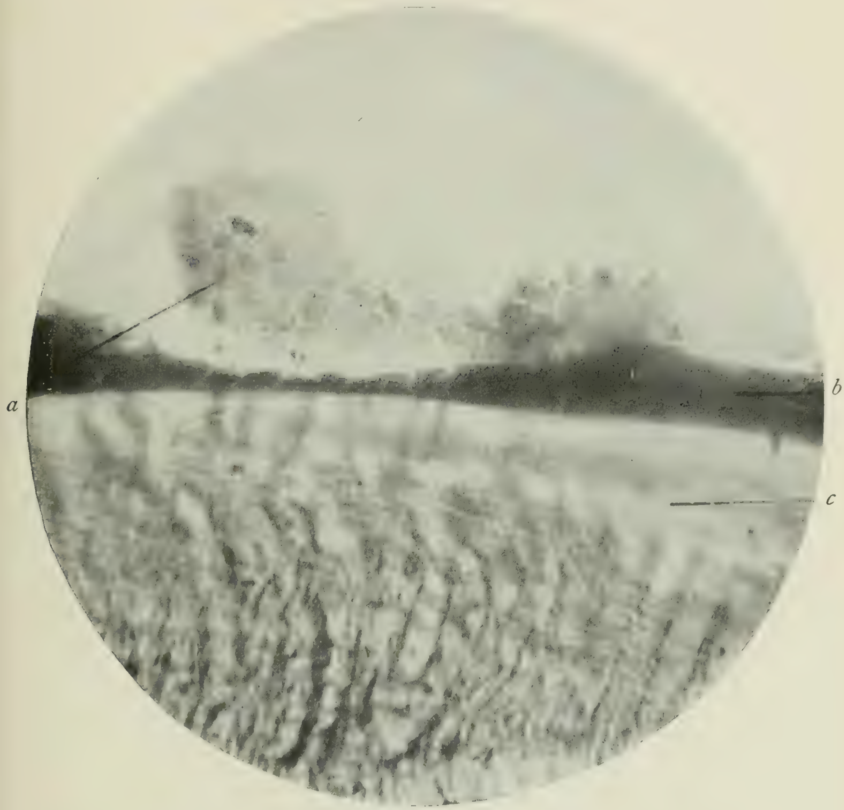


SECTION OF DEVELOPING TOOTH OF EMBRYO DOG. × 800.

a, Stratum intermedium ; *b*, Ameloblasts showing structure of nuclei ; *c* and *g*, Enamel-globules ; *d*, Formation of enamel-rods ; *e*, *f*, Showing possible origin of enamel-globules.

ment of enamel development, before there is any appearance of enamel-rods, as they are later when the enamel has reached a considerable thickness. This is beautifully shown in Fig. 37, where we may see the first indication of enamel-formation in the deposit of a single row of globular bodies on the surface of the dentine. On one side of the field the ameloblasts are slightly pulled away, showing the Tomes processes extending across a field five or six times as great as the diameter of the globular bodies which form the first layer of enamel. But whether in the form of droplets or strings this substance is probably calcoglobulin, an albumen-like material holding the calcific material, or at least some portion of it, in solution. For, as already several times indicated, it is plain, not only from partially decalcified specimens but also from those untouched by acids, that enamel is a much more complex substance, both with reference to the material as supplied by the enamel-organ and to the structure of completely-formed enamel, than has heretofore been supposed. Let us

FIG. 40.

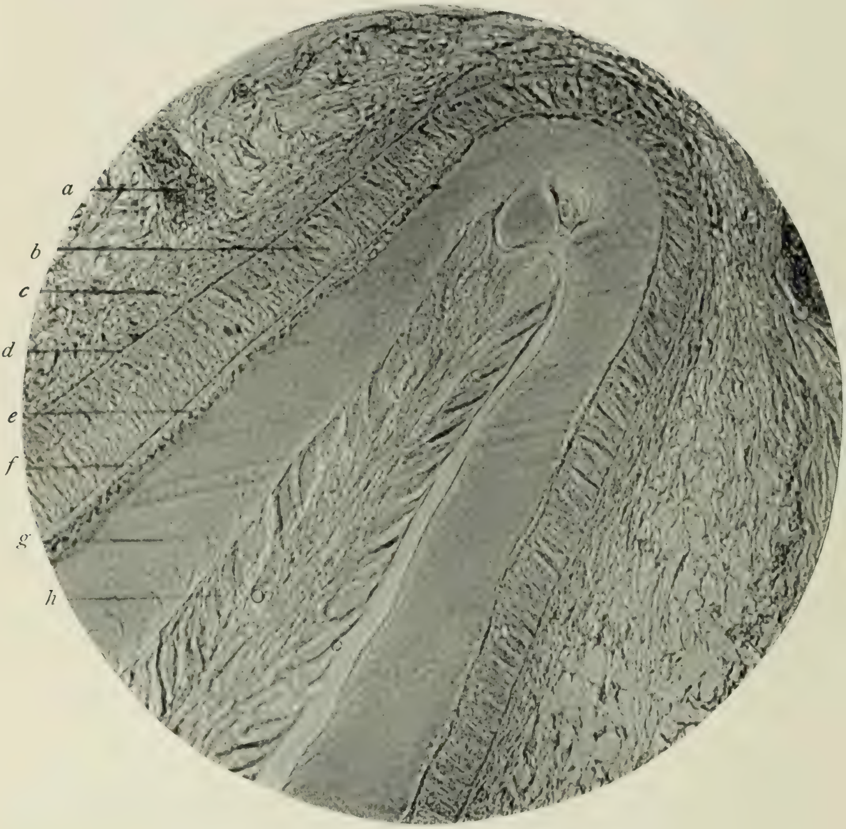


DEVELOPING PERMANENT TOOTH OF MONKEY, NEAR THE COMPLETION OF ENAMEL FORMATION. × 800. PREPARED BY THE WEIL PROCESS.

a, Enamel-globules; *b*, Most recently formed enamel deeply stained; *c*, Net-work of beaded fibers. The fibers are seen to pass in two directions at right angles to each other.

now compare a series of sections, cut from material immediately after fixing, with the acid-treated specimens which we have been studying. In Figs. 30 and 31 we saw, under low and medium magnifying powers, spherical masses of calcoglobulin appearing in the ameloblasts. A different phase of the same phenomenon is shown under much higher power in Fig. 38. These spherical masses are being deposited on the surface of the forming enamel. We observe that these masses, as previously pointed out, are not of uniform size, some evidently containing six or eight times as much material as others. But in this illustration which we are now examining there are important appearances not seen in the preceding ones mentioned. If we look closely at the last layer of developing enamel shown at *d*, we shall see that it contains a row of globular bodies of very regular and uniform size. These are manifestly identical with those seen along the edges of the

FIG. 41.

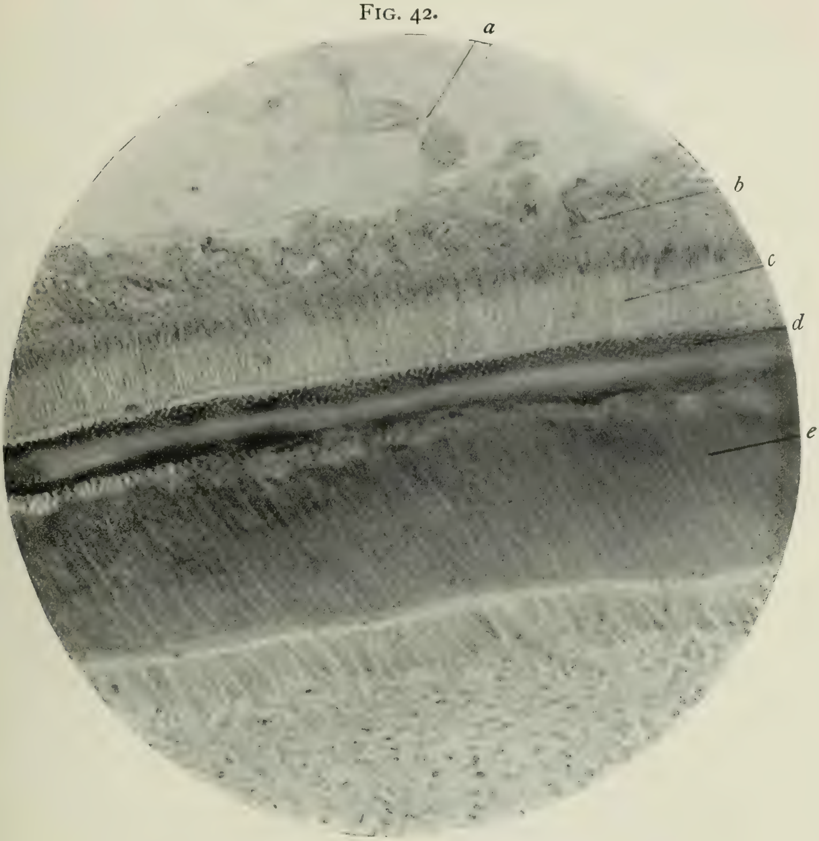


SECTION OF DEVELOPING TOOTH OF EMBRYO LAMB. × 275.

a, Blood-vessel with corpuscles *in situ*; *b*, Spherical mass of calcoglobulin; *c*, Stratum intermedium; *d*, Outer ameloblastic membrane; *e*, Commencement of enamel-formation by deposit of enamel-globules; *f*, Inner ameloblastic membrane; *g*, Dentine; *h*, Odontoblasts.

enamel in the acid-treated specimens shown in Figs. 33 and 35. They are quite distinct from the masses of calcoglobulin such as are shown at *c* in Fig. 38. In fact they are often, I may say generally, obscured by the melting together of the large irregular masses. The enamel-rods are built up by the successive, rhythmical, orderly deposit of these bodies of uniform size, which I shall henceforth denominate the *enamel-globules*. The larger, more transparent and irregularly sized bodies of calcoglobulin melt or flow together to form the interprismatic substance. This substance is more quickly destroyed by acid treatment than the enamel-globules, probably because the latter have at the time of their deposit a more definite organic structure than the former. This is the reason why, as noted by several observers, the so-called varicosities of the enamel-rods are the last phase of structure to disappear when completely formed enamel is subjected to acid treatment. The varicosities are formed by the calcification of

FIG. 42.

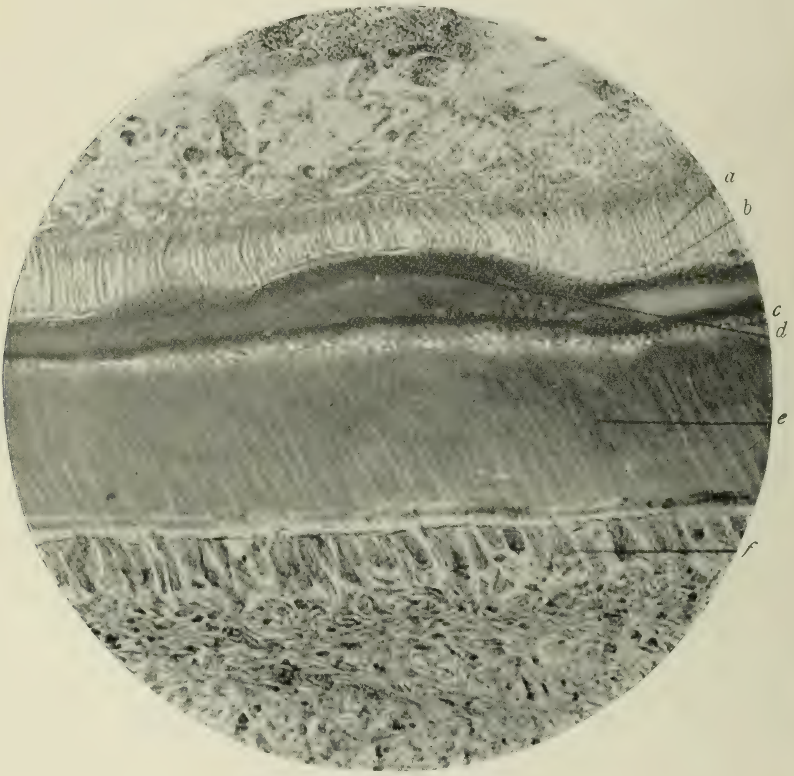


SECTION OF DEVELOPING TOOTH OF EMBRYO LAMB. × 300.

a, Blood-vessels showing corpuscles *in situ*; *b*, Showing outer epithelial tunic of enamel-organ united with stratum intermedium and development of secreting papillæ; *c*, Ameloblasts; *d*, Formation of enamel-rods by deposit of successive layers of enamel-globules; *e*, Dentine.

the enamel-globules which do not usually melt together, but retain their individuality, although connected in various directions by plasmic strings and radiating processes. These plasmic strings constitute the fibers shown in the enamel of the rat. In man and in many other animals these fibers, which are probably formed, as Ranvier has shown elastic fibrous connective tissue to be, by the juxtaposition of fine granules, are beaded and form a net-work often of very regular pattern, as we shall see in completely developed enamel. In the case of the enamel of the rat the granules are completely fused or melted together to form a smooth fiber. But whether beaded or smooth these fibers are always completely calcified, and are not to be confounded with the purely imaginary organic fibers which Bödecker has described as passing *between* the enamel-rods. The enamel-globules united by plasmic strings may sometimes be seen, under high powers, throughout the entire length of the ameloblasts. I have implied that high magnifying powers are necessary to see these bodies,

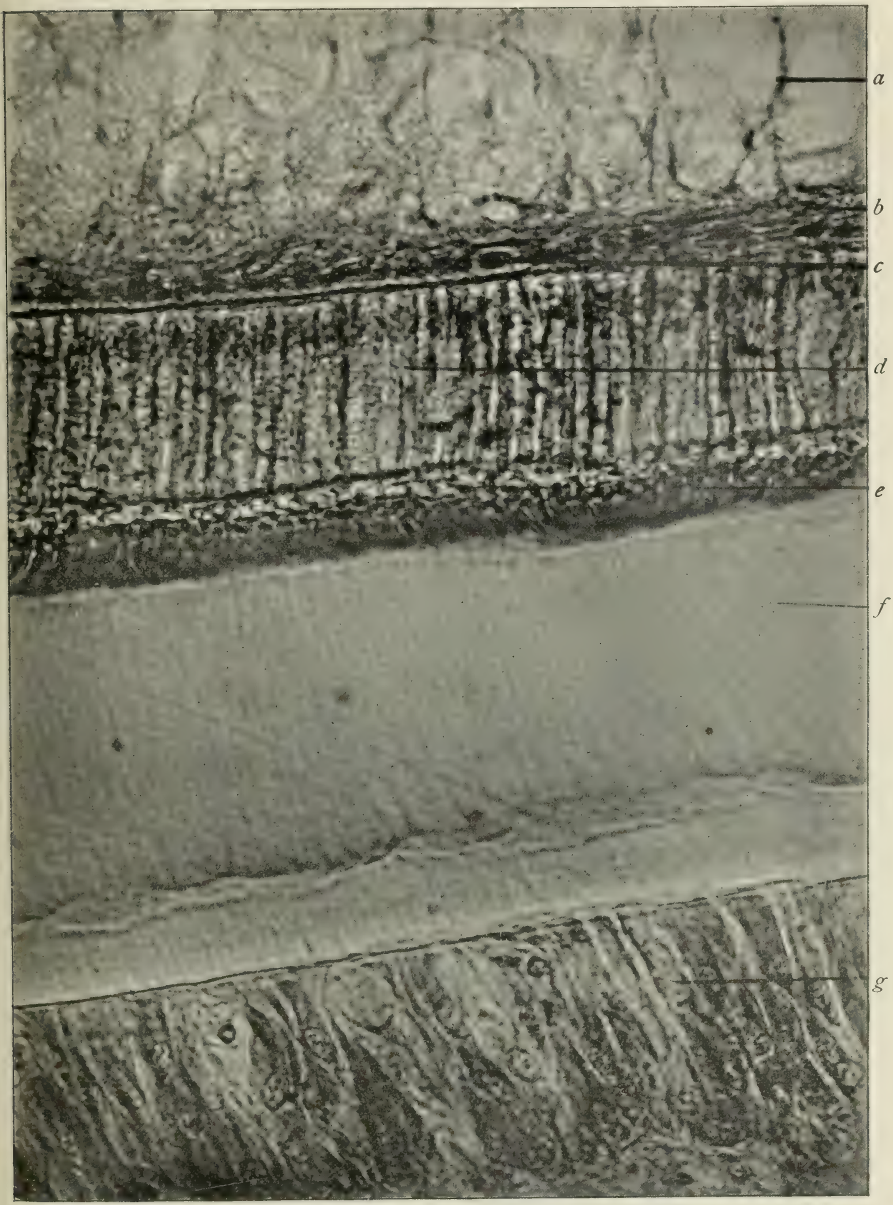
FIG. 43.



SECTION OF DEVELOPING TOOTH OF EMBRYO LAMB. × 300.

a, Ameloblasts; *b*, Formation of enamel-rods by deposit of enamel-globules; *c*, Showing enamel-globules at the line of union of enamel and dentine; *d*, Distortion of ameloblasts probably caused by rapid discharge of cell contents; *e*, Dentine; *f*, Odontoblasts.

FIG. 44.

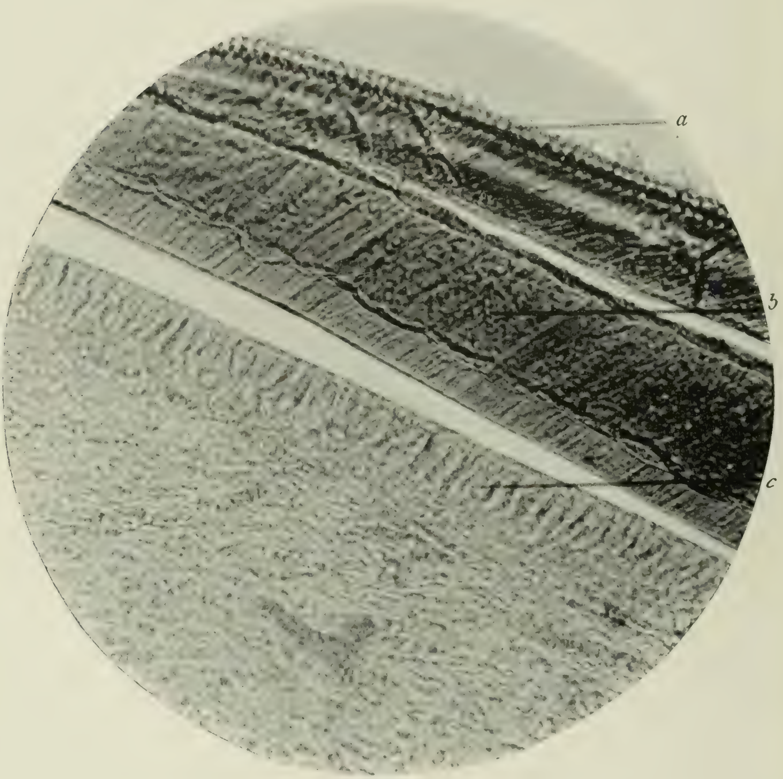


SECTION OF DEVELOPING TOOTH OF EMBRYO DOG. × 800.

a, Intercellular substance of enamel-organ, usually called "the stellate reticulum;" *b*, Stratum intermedium; *c*, Showing large nuclei of stratum intermedium united by radiating processes to outer ameloblastic membrane; *d*, Ameloblasts showing enamel-globules; *e*, Formation of enamel-rods by deposit of successive layers of enamel-globules; *f*, Dentine; *g*, Odontoblasts.

but with this point, as with many others in histological research, mere magnification is of much less importance than power of resolution. The enamel-globules when in the ameloblasts seem like a part of the cell, which they undoubtedly are, and their outlines can only be differentiated by fine lenses of high numerical aperture. At *b*, in Fig. 38, six enamel-globules can be seen completely filling the ameloblast from the nucleus to its inner end. In addition to these bodies there may also be seen in the ameloblasts in this illustration a larger number of the minute calcospherites which, by melting together, produce the larger masses of calcoglobulin. Some of these are shown at *e*.

FIG. 45.

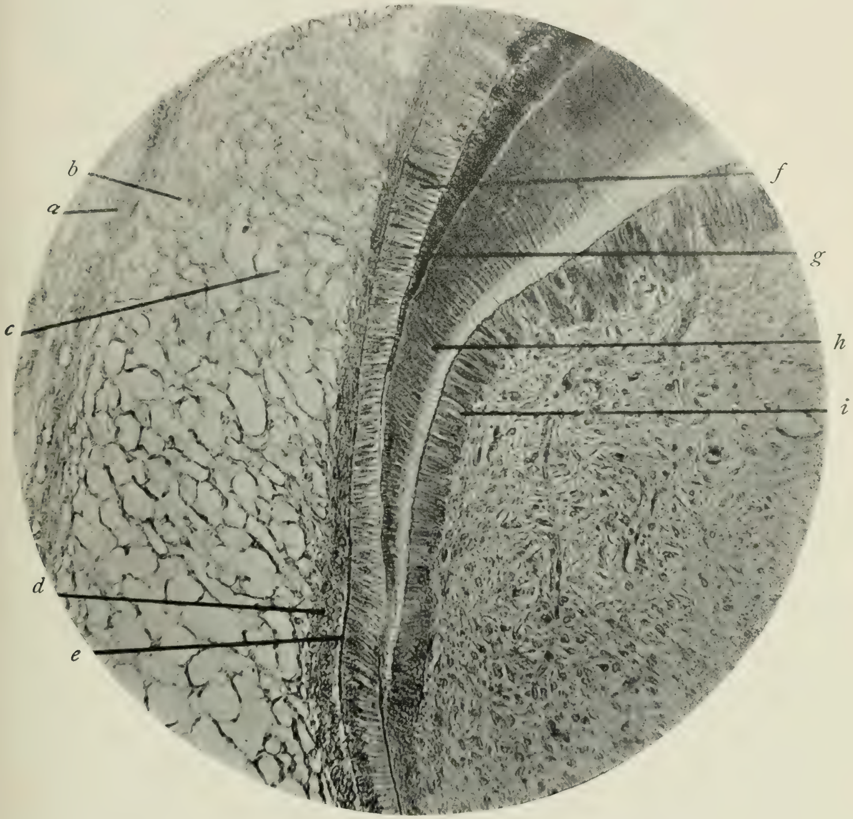


SECTION OF DEVELOPING TOOTH OF HUMAN EMBRYO. × 300.

a, Showing formation of enamel-rods by deposit of successive layers of enamel-globules; *b*, Dentine; *c*, Odontoblasts.

With regard to the origin of the enamel-globules, it may not be altogether heterodox teaching to suggest that they may be formed in or by the nuclei of the ameloblasts. It is not impossible that these bodies are of the same nature as the paranucleus or *Nebenkern* of recent investigators in the field of cell mitosis. All of the most brilliant histological investigation of the past ten or fifteen years has pointed more and more clearly to the nucleus as the seat of origin of the more important movements which result in tissue-formation. I am inclined to think that positions now tentatively held by some of the most advanced workers in this field will find confirmation in the methods of development of the dental tissues. While I am not prepared at present to offer a final opinion on the origin of the enamel-globules, I will call attention to such appearances as may be seen at *c*, *e*, and *f*, in Fig. 39. We observe here in the nuclei of the ameloblasts, and also apparently emerging from and just outside of the nuclei, bodies which are evidently identical with those seen throughout the entire length of the ameloblasts in Fig. 38. They may also be faintly seen in the lower part of some of the ameloblasts (at *g*) in Fig. 39.

FIG. 46.



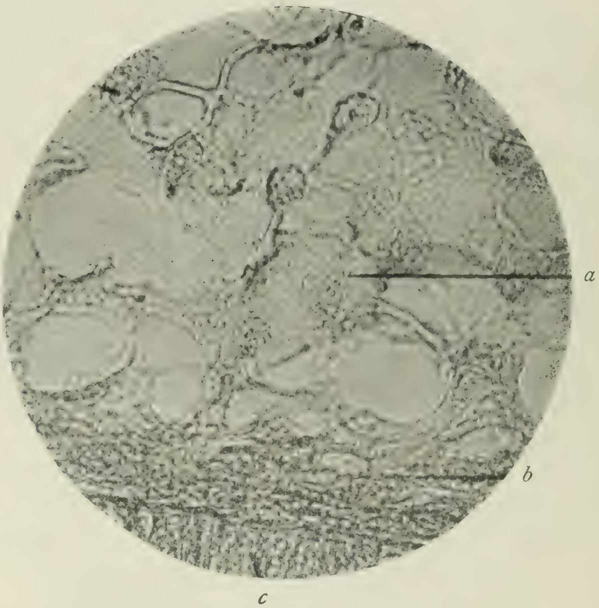
SECTION OF DEVELOPING TOOTH OF HUMAN EMBRYO NEAR SEVENTH MONTH OF FETAL LIFE. × 175.

a, Outer epithelial tunic of enamel-organ in which secreting papillæ are developed; *b* and *c*, Showing large, round, granular, nucleated cells of reticulum of enamel-organ. The stellate appearance in this tissue is largely produced by shrinkage and the washing away of the cell contents; *d*, Stratum intermedium; *e*, Outer ameloblastic membrane; *f*, Ameloblasts; *g*, Inner ameloblastic membrane; *h*, Dentine; *i*, Odontoblasts.

However the enamel-globules may be formed, it is certain that just at the completion of the enamel all traces of the characteristic ameloblasts disappear, and there is left, sometimes one or two, sometimes four or five rows of bodies which seem to be identical with those I have just been describing. I have observed this both in developing human teeth and in those of monkeys. The globular bodies are seen to be united by radiating processes and plasmic strings. (Fig. 40, *a*.)

The commencement of the deposit of enamel-globules is very finely shown in Fig. 41, which is from an extremely thin section of the developing tooth of an embryo lamb. Near the tip of the tooth but a single row of the globules is seen, but a little lower down on the side of the tooth the deposit of the second and third rows has commenced. The precision and order with which these globules are deposited in rows is very marked, and offers a complete explanation of the fact, hitherto unnoted so far as I am aware, that the varicosities of the enamel-rods are nearly always found to be arranged in regular rows. It is also clearly seen in this and in many other specimens shown that the enamel-globules are not formed by the breaking up of the ameloblasts, as claimed by Heitzmann and Bödecker. Both the outer and inner ameloblastic membranes are nearly always sharply defined, except when cut across in an oblique direction, and the enamel-globules are seen passing down the ameloblasts and emerging from the membrane bounding their inner ends.

FIG. 47.

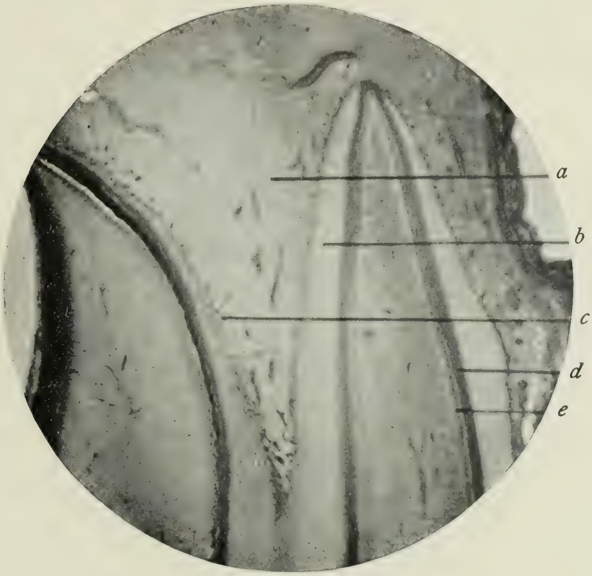


SECTION OF DEVELOPING TOOTH OF HUMAN EMBRYO. × 1000.

a, Large nucleated cells of middle layer (reticulum) of enamel-organ; *b*, Stratum intermedium; *c*, Ameloblasts.

Another proof of the existence of two distinct products of the enamel-organ is found in the specimen from which Fig. 41 was made. The refractive power of the enamel-globules appears to be the same as that of the ameloblasts and the surrounding tissues, and they therefore are always in focus with other features of the tissues. Not so, however, with the larger translucent masses of calcoglobulin, which are never clearly seen when all of the other features of the specimen are exactly in focus. A considerable number of these large masses may be seen in the ameloblasts shown in the specimen we are now examining, but so different is their refractive power that only one of them is faintly seen (at *b*) in the proper focus for photographing the section.

FIG. 48.



SECTION OF DEVELOPING TOOTH OF EMBRYO LAMB. × 80.

a, Connective tissue which sometimes closely resembles the reticulum of the enamel-organ; *b*, Reticulum of enamel-organ; *c*, Formation of secreting papillæ and capillary loops in epithelial cells of outer tunic of enamel-organ; *d*, Stratum intermedium and ameloblasts; *e*, First formed layer of dentine.

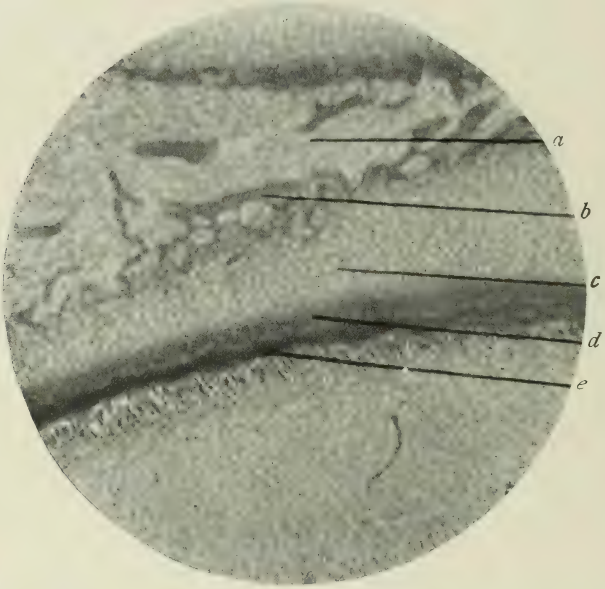
The deposit of the enamel-globules in the formation of the enamel-rods, as well as their orderly arrangement in rows passing transversely across the rods, is shown in Fig. 42, where the successive rows may be seen throughout half the thickness of the enamel-formation. The same features are seen in Fig. 43, which also shows a curious appearance, not infrequently seen in the developing teeth of embryo lambs. It shows a distortion of the ameloblasts apparently caused by the sudden or rapid discharge of the cell contents in a certain locality.

Human enamel is built up in substantially the same manner as that of the pig, sheep, dog, and monkey, which we have been describing. This is shown in Fig. 44, where the deeply-stained band of enamel at *e* is seen to be composed of five or six rows of superimposed enamel-globules. The globules are seen to be disposed in regular order, both in a longitudinal and a transverse direction. The latter arrangement is connected with the formation of the incremental lines, while the former produces the enamel-rods, the commencing differentiation of which may already be seen.

The radiating processes by which the cells of the stratum intermedium are united to one another and to the outer ameloblastic membrane are also clearly shown in this illustration.

Fig. 45 is noteworthy as showing a considerable thickness of enamel and dentine cut by the freezing process without acid treatment. The tissues are slightly torn apart, and there are small cracks in the enamel, but just where the ameloblasts have been torn away we can plainly see three or four rows of enamel-globules in undisturbed relation.

Fig. 49

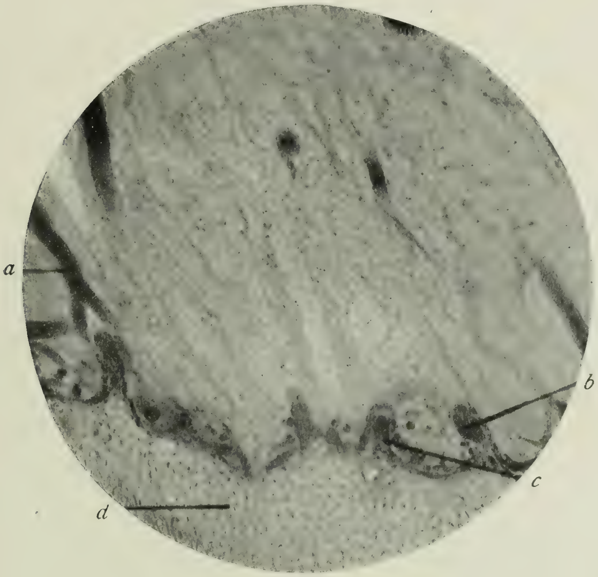


Section of Developing Tooth of Embryo Lamb. × 150.

a, Connective tissue outside of outer tunic of enamel-organ in which blood-vessels supplying enamel-organ are developed; *b*, Blood-vessels with blood-corpuscles *in situ*; *c*, Reticulum of enamel-organ; *d*, Ameloblasts; *e*, First formed layer of dentine.

Several of the foregoing illustrations are from specimens mounted in balsam, which, while they often show detail in the first-formed layers of enamel more clearly than glycerol mounts, are much inferior to the latter for a critical study of cellular structure, especially if one desires to use high magnifying power. This is plainly evident in Figs. 46 and 47 and several of the following illustrations. Fig. 46 is a photograph of a section cut from the developing tooth of a human embryo at the time of the commencement of enamel-formation, near the seventh month of intra-uterine life. Beginning at the left side of the illustration, we see the outer tunic of the tooth-sac with many blood-vessels shown in transverse section and the commencement of the formation of secreting papillæ. To the right of this appears the so-called stellate reticulum of the enamel-organ. I think it will be seen from the section we are now examining that this tissue is not correctly represented in most of the text-books treating of the subject. I perfectly agree with Professor Sudduth in regarding the cells of this tissue as a modified form of those composing the middle layer of the oral epithelium. But the "reticulum" of the enamel-organ is not composed of cells which have been changed from a polygonal to a stellate form. The stellate structure is simply the intercellular substance which is left after the removal of the cell contents. In the development of the enamel-organ the epithelial cells which constitute the bulk of this tissue undergo some change which renders their contents much softer, more watery, and thus more easily washed away in the preparation of sections. I have never yet seen a thin, balsam-mounted section in which the cell contents of the stellate reticulum were preserved. By rapid fixation with Fleming's or Hermann's solution, and by exercising the greatest care in manipulation, the cells may sometimes be completely preserved in glycerol mounts. This is perfectly shown in Figs. 46 and 47, where the nucleated cells are seen lying in the so-called reticulum, which is simply the slightly modified cell wall. Certain methods of treatment of the oral epithelium will produce appearances closely resembling the usual

FIG. 50.

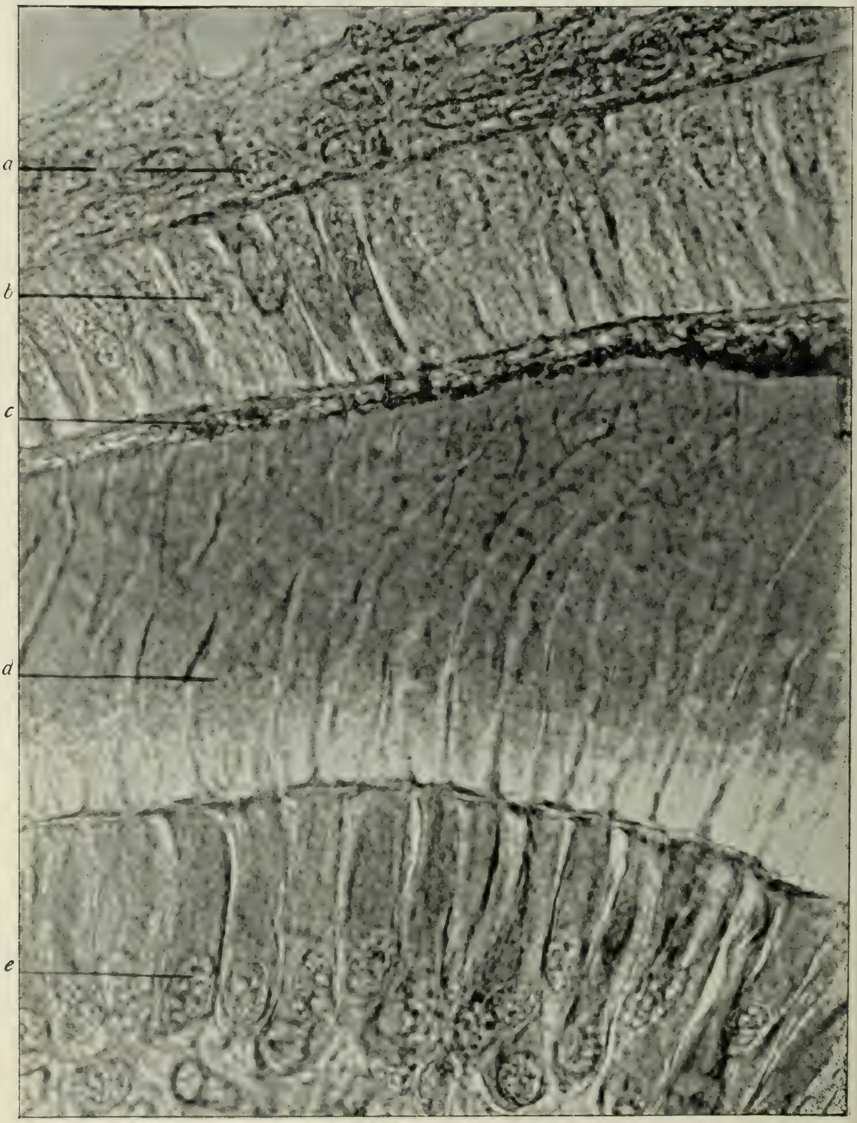


SECTION OF DEVELOPING TOOTH OF EMBRYO LAMB. × 150.

a, Blood-vessel with corpuscles *in situ*; *b*, *c*, Development of secreting papillæ in epithelial cells of outer tunic with loops of capillaries seen about them; *d*, Stellate reticulum.

illustrations of the "reticulum" of the enamel-organ. The nuclei which are often seen at the points of intersection of the stellate reticulum are simply the *corners* of other polygonal cells which have been

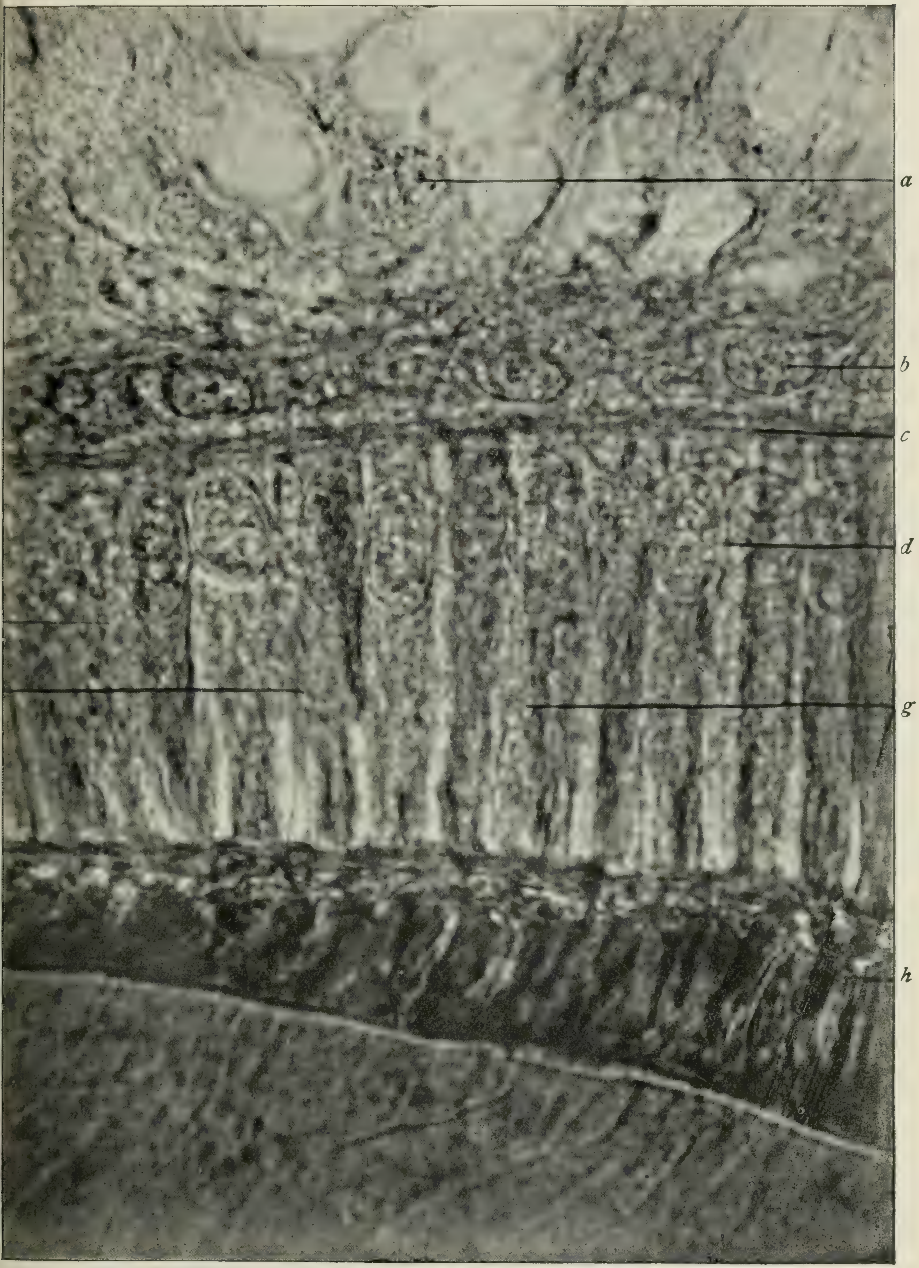
FIG. 51.



SECTION OF DEVELOPING TOOTH OF HUMAN EMBRYO. × 1000.

a, Cells of stratum intermedium showing structure of nuclei; *b*, Ameloblasts; *c*, Enamel-globules showing radiating processes; *d*, Dentine; *e*, Odontoblasts showing structure of nuclei.

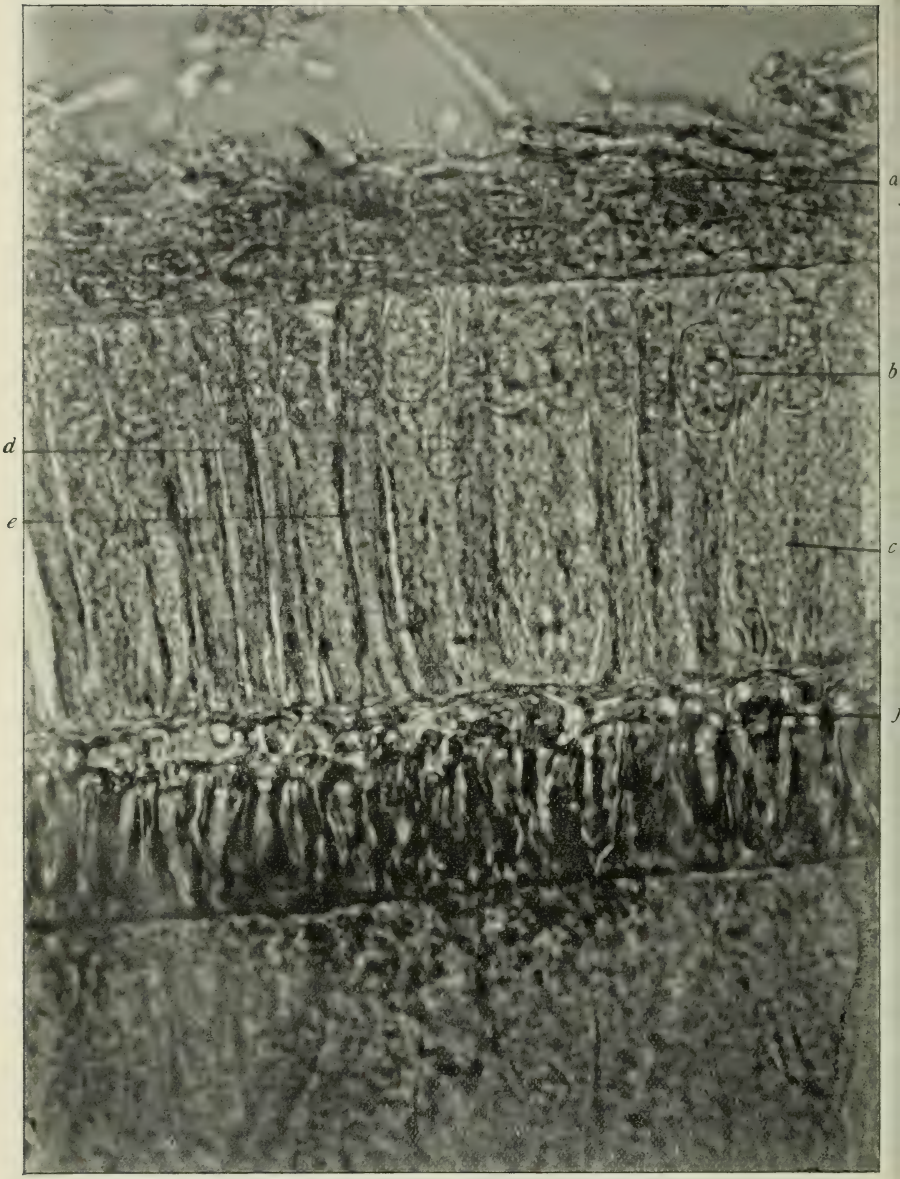
FIG. 52.



SECTION OF DEVELOPING TOOTH OF HUMAN EMBRYO NEAR SEVENTH MONTH OF FETAL LIFE. × 2500.

a, Nucleus of large, granular cells of middle part of enamel-organ; *b*, Nucleus of cell of stratum intermedium; *c*, Outer ameloblastic membrane showing several layers; *d*, Nuclei of ameloblasts showing double rim and radiating processes; *e*, *f*, *g*, Enamel-globules in ameloblasts; *h*, Enamel-rods.

FIG. 53.

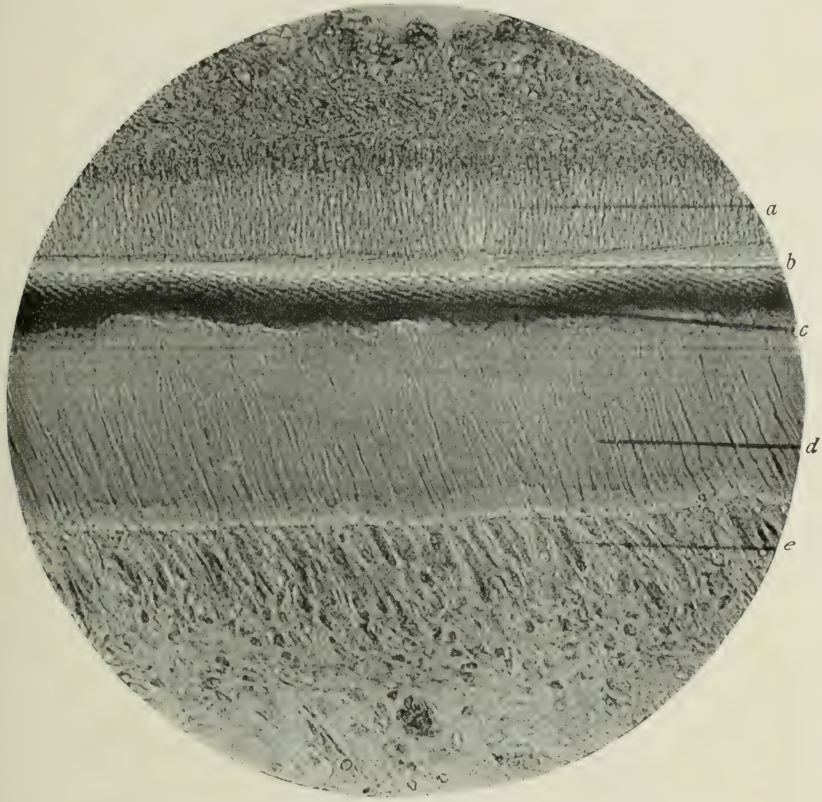


TRANSVERSE SECTION OF DEVELOPING TOOTH OF RECENTLY BORN PUPPY. × 2500.

a, Nucleus of cell of stratum intermedium; *b*, Nucleus of ameloblast; *c*, Enamel-globules faintly seen in ameloblasts; *d*, *e*, Net-work in ameloblasts; *f*, Formation of enamel-rods.

cut across in making the section, and being of small area are not washed away in manipulation. With reference to the long-disputed point of the existence of blood-vessels in the stellate reticulum, I have to say that in the examination of many thousands of sections from embryos of all ages, taken from many different animals, I have never yet seen a blood-vessel in this tissue. During the later steps of tooth-development blood-vessels are everywhere seen in the stratum intermedium, as I have already described ; but they are never seen there, according to my experience, until after the disappearance of the stellate reticulum. The difference of opinion on this point has, I believe, grown out of a mistake which may often occur. I have many specimens in which the connective tissue lying immediately outside the tooth-sac bears a most striking resemblance to the stellate reticulum. This resemblance seems to be most marked near the time of the disappearance of the stellate reticulum, when the cells of the walls of the tooth-sac come down and unite with those of the stratum intermedium

FIG. 54.

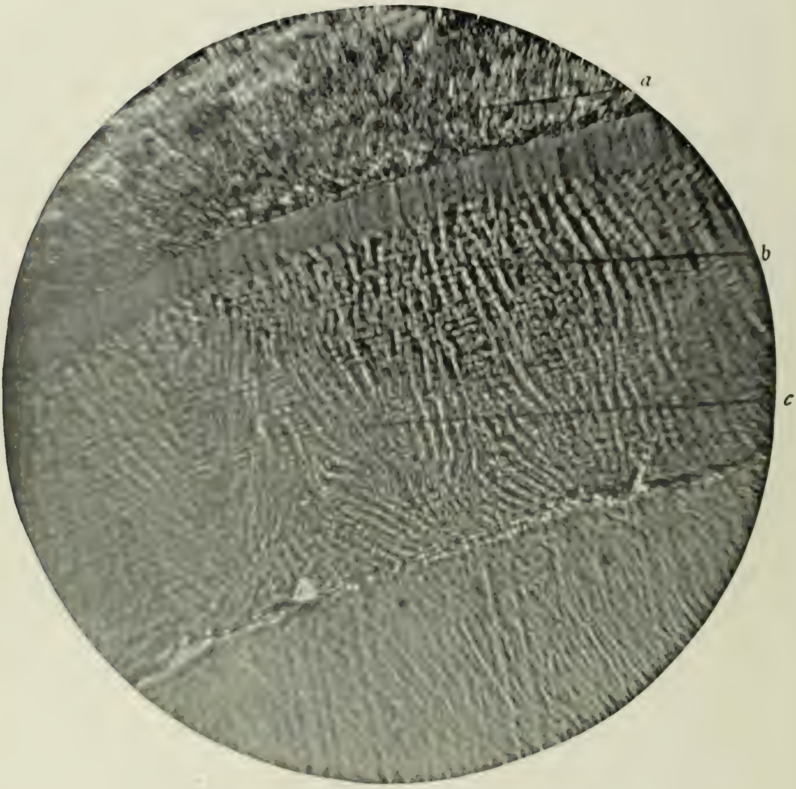


SECTION OF DEVELOPING TOOTH OF EMBRYO LAMB. × 275.

a, Ameloblasts ; *b*, Showing fibrous nature of inner ameloblastic membrane ; *c*, Formation of enamel-rods ; *d*, Dentine ; *e*, Odontoblasts.

(see Figs. 48 and 49). This tissue, which is everywhere pervaded by blood-vessels, may have been mistaken for the stellate reticulum. The resemblance of the tissues is shown in the accompanying illustration (Fig. 49), but the abrupt manner in which the blood-vessels terminate in the cells of the walls of the tooth-sac is very marked. Referring to the papillary structure of the stratum intermedium which I have already described in the enamel-organ of the mouse and rat, it would appear that something very analogous to this structure is present in all developing teeth. The epithelial cells of the outer tunic which lines the tooth-sac are seen to be arranged in papillæ-like forms about the capillary loops. As the stellate reticulum disappears, this papillary layer approaches and finally melts into or coalesces with the stratum intermedium, which, at this stage in nearly all embryos, closely resembles that of the rat or mouse. (See Figs. 48 and 50.)

FIG. 55.



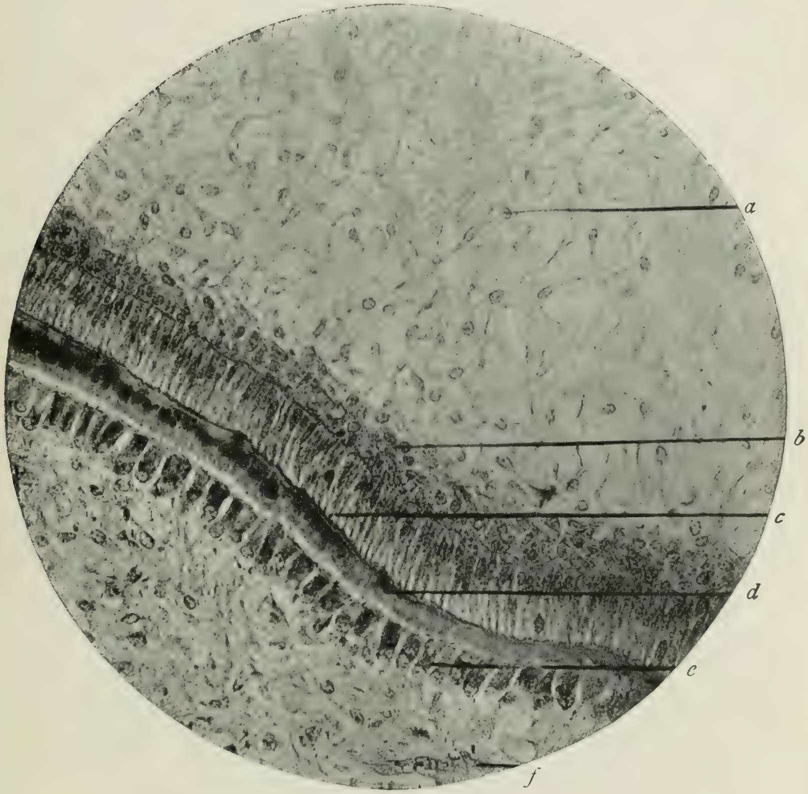
SECTION OF DEVELOPING TOOTH OF EMBRYO DOG. × 300.

a, Ameloblasts showing in transverse section; *b* and *c*, Enamel-rods showing connection by formation of plasmic strings or fibers which pass through the rods in line with the varicosities.

Returning for a moment to Fig. 46, we observe every stage of the formation of a tooth-crown in progress as seen under a power of about

175 diameters. We see the very commencement of both enamel and dentine formation, but for details of this process or for studying the more minute structure of the cells we must resort to a much higher power. This we have in the illustration Fig. 51, which is a small portion of Fig. 46, magnified about 1000 diameters. The deposit of the first enamel-globules is clearly seen at *c*, and the connection of these bodies by processes is also shown. The existence of the inner and outer ameloblastic membranes is finely demonstrated, and the spongiose structure of the nuclei is beautifully shown. Under still higher power (Figs. 52 and 53) the nuclei of the ameloblasts are seen to bear a regular structural form, consisting usually of a central point with radiating processes connected to an outer double rim. (Fig. 52, *d.*) The inner and outer borders of this double rim are also connected by processes passing across the light field or space which separates them. The arrangement of the cell-contents in the form of a net-work, the lines of which run transversely and longitu-

FIG. 56.

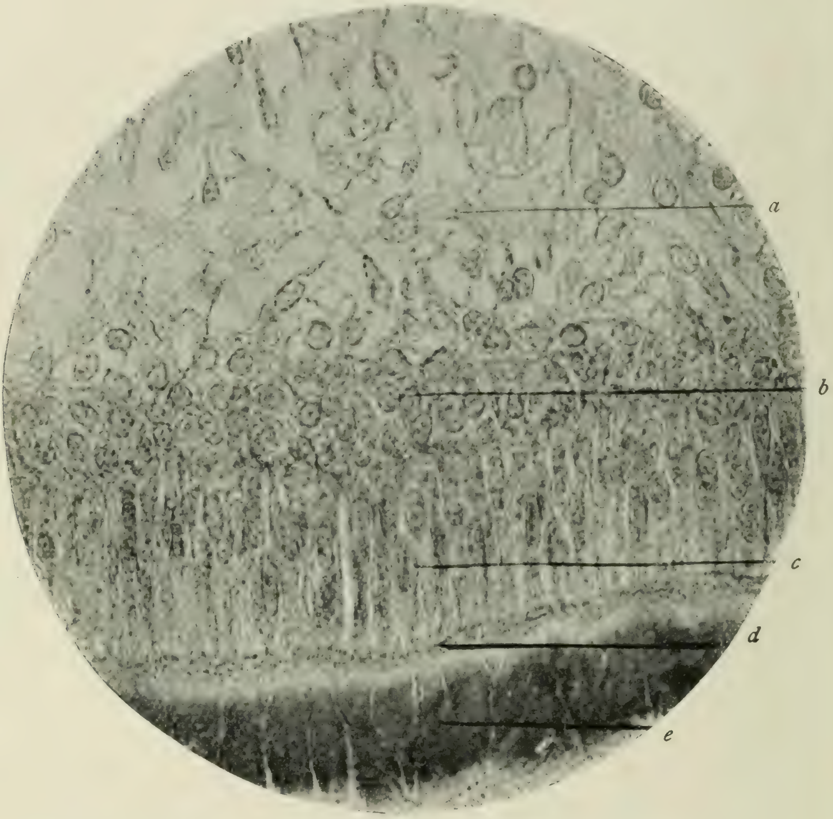


SECTION OF DEVELOPING TOOTH OF EMBRYO CALF. × 275.

a, Stellate reticulum of enamel-organ; *b*, Stratum intermedium; *c*, Ameloblasts; *d*, Dentine; *e*, Odontoblasts; *f*, Blood-vessel—corpuscles *in situ*.

dinally, is shown in the ameloblasts at *d*, *e*, Fig. 53. One may also faintly see the enamel-globules in these cells, particularly at *f*, *g*, Fig. 52. These bodies are seen to have a regular structure, which structure, as we shall see, corresponds perfectly with that shown in the varicosities of the enamel-rods in ground sections of mature enamel. To the expert, one of the most striking features of these photographs will probably be the complete absence of any evidence of shrinkage, and the guarantee which this gives of truthfulness of appearance. In the last two mentioned illustrations, but particularly in Fig. 52, we see that the inner and outer ameloblastic membranes are composed of several layers of protoplasmic strings or fibers. In a section of a developing tooth of an embryo lamb (Fig. 54), where a slightly oblique cut has been given in making the section, so that we may look, as it were, upward toward the inner ends of the ameloblasts, we observe a large number of these fibers or strings passing in two directions across

FIG. 57.

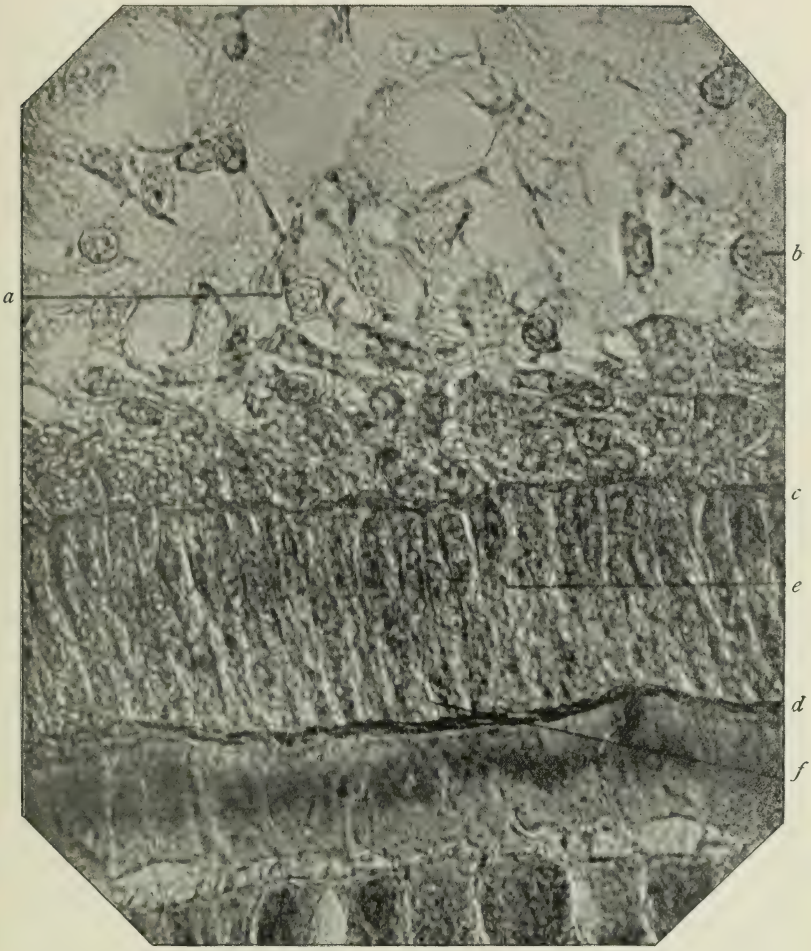


SECTION OF DEVELOPING TOOTH OF EMBRYO CALF. × 800.

a, Reticulum of enamel-organ showing structure of nuclei; *b*, Showing stratum intermedium with structure of nuclei; *c*, Ameloblasts; *d*, First formed layer of enamel; *e*, Dentine.

the enamel-rods. In both directions they are seen to pass in line with the varicosities of the enamel-rods. The effect of this is finely shown in Fig. 55, in which the enamel-rods are seen to be united at the point of the largest diameter of the varicosities by the passing of these plasmic strings.

FIG. 58.



SECTION OF DEVELOPING TOOTH OF EMBRYO CALF. × 1000.

a, *b*, Nuclei of reticulum of enamel-organ, showing spongiose character; *c*, Outer ameloblastic membrane; *d*, Inner ameloblastic membrane; *e*, *f*, Enamel-globules faintly showing nuclear net-work.

The appearances in sections of the developing teeth of embryo calves are, as we might expect from an examination of the fully formed bovine enamel, somewhat different from those presented in the embryo teeth of most other domestic animals. The varicosities of the enamel-rods are produced by the deposition and superposition of bodies resembling disks more than globules. One noticeable result of this difference is the much more markedly striated appearance of the enamel so formed. In specimens stained with nigrosine, the first formed enamel often looks as though it were laid down in successive sheets, so evenly and simultaneously does this deposit of disks occur. (Fig. 57, *d.*) The ameloblasts present certain peculiar appearances, being considerably constricted at their inner ends and bulging out just at that part of the cell where the nucleus is placed. The position of the nuclei in these cells varies more than in the developing teeth of any other animals which I have observed. This difference is not so marked in the later as in the earlier stages of development.

Every phase of the enamel-forming tissues in the tooth of an embryo calf is well displayed in Fig. 58, at the beginning of enamel-formation. The spongiose character of the nuclei of the stellate reticulum is shown with almost diagrammatic clearness. The ameloblasts are filled with bodies which one might accurately describe by saying that they look like faint reproductions of the nuclei, except that they are nearly or quite round instead of oval, as are the nuclei. These bodies in the lower ends of the ameloblasts, and especially after they have passed through the inner ameloblastic membrane, appear to be compressed into a disk-like form, as already mentioned.

(To be continued.)

[NOTE.—By an unfortunate error, Fig. 19, on page 116 of our February number, is printed in reversed form, making the letter references at side of cut misleading. *b* is correct, but *a* and *c* should be transposed.—ED. DENTAL COSMOS.]

PRACTICAL UTILITY OF ACCURATE STUDIES OF THE PHYSICAL PROPERTIES OF THE TEETH AND OF FILLING-MATERIALS.

BY G. V. BLACK, M.D., D.D.S., SC.D., JACKSONVILLE, ILL.

(Read before the New York Odontological Society, January 21, 1896.)

IN any scientific investigation there are seemingly two sides, or aspects, in the view that may be taken as to results. In the one, the record of the facts ascertained is the important matter without reference to any practical or commercial reckoning of the importance of these facts. In the other view, nothing is important that is not shown to have an immediate or clearly prospective commercial value. In this sense there is no difference in the meaning of the words *practical* and *commercial.* The thing that is practical is that which will bring a return in dollars. In the broader sense it means something that people want and will pay for the possession of. Anything that will benefit humanity is of practical or commercial value.

There is a wide difference, however, in the results of scientific investigations as to their practical features. It often happens that facts, important in science, are discovered seemingly before their time; that is, before correlated facts are known that will allow of their practical utilization. Frequently the observer who develops an important scientific truth fails to discover its true relation to correlated truth, and others form this connection. One very striking illustration of this happened in connection with the development of the telegraph. Professor Joseph Henry, later of the Smithsonian Institute, while at work on the subject of electricity, developed the fact that electric signals could be sent through great lengths of insulated wire hung about the walls of his room, and recorded the result as a fact in science simply. Professor Morse wove these signals into an alphabet, stretched the wire from Washington to Philadelphia, and demonstrated the commercial value of the fact. This class of incident has been repeated so often in the history of the development of modern times that the scientist does not regard any form of fact discovered as valueless, simply because he, or the world at large, fails to see the way in which it may be made useful to man, but treasures it as a fact in science.

In the work upon the teeth and filling-materials which I have been doing for some years past, many things have come to light which had not been suspected before. These have often been as much of a surprise to myself as to any one else, and it may be that I am no better fitted to determine their correlation to other facts in dental science than many others ; possibly I may be less well fitted for such a task. Many workers in science prefer not to undertake to point out the practical relation, or commercial value of facts discovered, but to simply place them on record in the scientific field ; this is called "pure science." However, so many, by letter and otherwise, have asked questions about what I have written for the DENTAL COSMOS within the last year, that I have felt that I should publicly say something more.

The work upon the teeth has been the most complete in the range that was intended to be covered. The work on filling-materials, amalgam and gold, is still in progress. It is not regarded as by any means complete. As to that, however, no studies in science can be regarded as complete only for the time. We are not justified in saying that we know *all* about any subject. Often people make the mistake of supposing that this or that subject is fully understood. In the beginning of my work on silver-tin amalgams, one gentleman wanted to know what I meant to do ? If I had read certain books and papers ? And stated that the subject of Dental Amalgams was perfectly understood. I take it that there are but few subjects of which such a statement can properly be made. When I am through with this subject I shall certainly not know *all* that is to be known about it, but I hope I shall have brought to light some facts of both scientific and practical value that had not been known.

The Scope of the Work upon the Teeth.

In the work upon the teeth the points covered were : 1st, The variations in the percentage of lime-salts in the human teeth. 2d, The relation of these variations, if any, to the diseases of the teeth, especially caries, but including diseases of the peridental membranes, and the supposed loss of lime-salts, softening of the teeth, in women during the period of child-bearing. 3d, The relation of the percentage of lime-salts to the strength of the dentine, and to the strength of the teeth. 4th, The force used in ordinary voluntary effort in biting and in mastication, and the relation of this force to the strength of the teeth. It did not include possible variations in the composition of the lime-salts. It did not include variations in the *hardness of the teeth to cutting-instruments*. I wish to make these negative statements here and give them prominence for the reason that many, in conversation and in private letters, have seemed to be impressed with the notion that these points, especially the last, were included.

The results of this investigation are in the hands of the profession through the pages of the DENTAL COSMOS, so that here I need only summarize briefly. The results show the percentage of lime-salts in the human teeth to be very uniform. The slight variation found bears no relation whatever to caries of the teeth ; it has no relation whatever to diseases of the peridental membrane. The percentage of lime-salts in the teeth of women is not reduced during the period of child-bearing. The percentage of lime-salts bears no very constant relation to the strength of the teeth as tested by pressure upon blocks of dentine.

These results are in a sense negative, and yet not negative by any means, and the findings affect prominently views previously held upon all of the points mentioned, and it is in this that it has its practical bearing upon our every-day observations, determinations, and operations.

Caries of the teeth presents wide differences in intensity in different persons, and in the same person at different times. Some persons' teeth decay rapidly and many cavities occur. In others fewer cavities occur, but still the progress of the caries occurring is rapid. In still others the progress of caries is slow, and many or few carious spots may occur. Again, in other cases, no caries whatever occurs during a lifetime. In some, caries occurs and makes rapid progress in youth, and if the damage is skillfully repaired, the tendency to caries disappears partially or wholly with advancing age. In other cases, caries is persistent throughout life, or until the teeth are destroyed. Certainly all of these differences are seen constantly in our practice.

This investigation does not clear up the mystery which still prevents an explanation of the reasons why some people are very susceptible to caries, while some are less susceptible, and still others are wholly immune. But it does clear up a grave misconception as to these differences, for heretofore it has been the habit of thought of many in the dental profession to attribute these differences in the susceptibility of persons to caries of the teeth to differences in the relative proportion of lime-salts they contain. The development of the investigation dispels this view very completely, and eventually will lead investigation in other directions, the most probable of which, serum pathology, has been indicated in the papers.

In a sense, this general fact has been developed before another cause of difference in comparative susceptibility to caries has become demonstrable. In a large sense all scientific development moves together, and it now appears that this will have to await development in other fields of thought as many other announced facts have had to wait. When Robertson announced, in 1835, his conclusion that caries of the teeth was caused by acids developed by fermentation at the very spot where the caries occurred, it could not be demonstrated, and its full truth and meaning had to await the development of a totally new science, then practically unborn,—bacteriology,—through which Miller, of Berlin, fifty years later, demonstrated very precisely the steps of the process by which the acid is formed and the true nature of the caries process, proving the propositions of Robertson. Just so the nature of the differences in susceptibility of persons to caries will probably have to await the development of facts in the lines now being so successfully studied, which is developing serum therapy and unfolding the causes of the differences in the immunity and susceptibility of different persons, and especially different classes of animals, to certain diseases. Dr. Sternberg, of Washington, has recently collected the principal facts developed in this line of thought into a neat little volume, and rendered it available for your study.

In another direction the results are of immediate practical value. It has become a habit of so many dentists that it may almost be regarded as the habit of the profession to regard teeth that are seen to be decaying rapidly as *soft* teeth ; teeth that are poorly calcified ; teeth that will inevitably be lost on account of their poor quality as teeth ; and to plainly tell patients that their teeth are poor in quality. This is demonstrated to be an error as plainly as any demonstration can make it. Teeth that are rapidly decaying are as apt to be well calcified, strong, and dense, as teeth in which no decay appears. It is emphatically not the difference in the calcification of the teeth, the amount of lime-salts they contain, that constitutes the basis of the difference in their susceptibility to caries. Differences in treatment, based upon this supposition, lead to misfortune. It leads the dentist to cease his efforts in the use of what he may consider the best of filling-material, and substitute something that is easier, in exactly the case that demands his highest skill. It leads patients to the notion that efforts to preserve their teeth will be futile, and begets negligence. From what we now know, such a course is wrong, and the dentist in pursuing it is wronging his patient, himself, and his community. The facts are that rapidly decaying teeth are sufficiently hard for any kind of filling-operations, even those that may be poorest in lime-salts. The contention is not that the teeth are equally hard and dense, as will sufficiently appear later, but that these differences bear no relation to their diseases. We know that the active cause of caries does not exist within the tooth, but is from without, acting primarily upon its surface, and does not appertain to differences in its structure. Differences in susceptibility are, in all reasonable probability, from without also, and are conditions that are now well known to be variable or changeable. It is certain that many cases of the condition of rapidly decaying teeth, when occurring in young persons, disappear with increasing age if the proper efforts are made to limit the damage done. I know of no greater evil existing in the dental profession than that of looking upon such cases as soft or poorly calcified teeth, and it becomes doubly so when such ideas are communicated to the patient.

In this connection, I wish it distinctly understood that I recognize such faults of form as give opportunity for lodgment of food débris favoring decomposition in intimate contact with the tissues of the teeth, as conditions favorable to the beginning of caries. Any fissures, or imperfect closure of the lines of junction of the enamel plates, pitting of surfaces, bad forms of the interproximate spaces, etc., give opportunity for caries. Interglobular spaces occurring in the dentine, or other forms of abnormal openings in their tissues which favor rapid ingress of micro-organisms, serve to increase the rapidity of caries. These classes of faults of form and structure have been revealed by macroscopic and microscopic examination long ago, and my recent investigations have no relation to them whatever.

Since the publication of my papers, I have been so frequently asked about *differences in the hardness of the teeth to cutting-instruments* that I wish to say emphatically that there was no intention of saying anything whatever on that point in what I have written. Whenever hardness or softness of the teeth is mentioned, it has been with reference to the prevailing expression of hardness or softness as expressing the idea of more or less perfect calcification, or with reference to the ability of the dentine to withstand heavy pressure without crushing. It has not had reference to the behavior of the teeth before cutting-instruments. I did try to investigate that point, and tried a number of plans. None of them gave results that were satisfactory, or that I thought valuable. I will say here, however, that experimentally out of the mouth I was unable to find any marked difference between teeth classed as soft and teeth classed as hard, and the impression upon my mind is that much of the difference in the hardness of the teeth as found in operating in the mouth is a matter of position, direction of cutting, and opportunity. Still, however, I am finding in practice that which appears to be very considerable differences in the hardness of teeth to cutting-instruments. I am persuaded that in many cases men have mistaken for normal dentine dentine softened by partial solution of the lime-salts.

The strength of the teeth under stress is something very different from their hardness before cutting-instruments, and probably not at all correlated. The variations in the strength of the teeth have been shown in the May issue of the Cosmos, 1895. The difference found amounts to thirty-five per cent., excluding pulpless teeth, or forty-one per cent., including pulpless teeth. When we consider the narrow range of variation of lime-salts, this difference in strength seems very wide, but is found not to be directly dependent upon the percentage of lime-salts.

The weakest dentine found, living when the tooth was removed, bore a stress of one hundred and ninety-five pounds on a block .085 x .085 x .085 of an inch, which equals two hundred and seventy pounds on a block one-tenth of an inch square, the size of the experimental gold fillings you have made for examination. The strongest of these fillings was shortened two per cent. by a stress of two hundred and fifty pounds. In other words, that hardest of your gold fillings can be crushed out of all semblance of its original form upon a block of dentine from the weakest human tooth, without injury to the dentine. This is enough to say about teeth "too soft for gold fillings." The quicker that idea is out of the heads of dentists, and the laity as well, the better.

But this fact does not give you license to drive your plugger-point through your gold onto the dentine or enamel and chop it into powder ; strong as is dentine, it will not bear the severe contact of hardened steel. Neither does it give you license to abuse a sensitive peridental membrane in hammering in a gold filling. We are not always justified in making a gold filling immediately for a sensitive child, simply because the tooth is sufficiently strong. The condition of the pulp of the tooth may not justify such a course, or even the dentine may be too sensitive. It must be remembered that we operate on living tissue, and, though the tooth itself is always hard enough, its condition and the surroundings must have due consideration. When this has been given, and the case brought into proper condition of health, the strength of the tooth is always sufficient. This does not justify us in filling against frail walls of cavities, or against unsupported enamel in positions where stress comes upon it ; teeth are brittle, and thin laminæ are easily broken.

The most serious hindrance to the proper condensation of gold fillings is found in the condition of sensitiveness of the peridental membranes. From the examinations I have made I conclude that in a state of nature,—that is, living upon foods presented in the natural state,—man would be able to close his teeth with a force of from two to three hundred pounds. But in the conditions of civilization and the artificial preparation of food-stuffs the peridental membranes are generally not accustomed by usage to such severe stress, and, for this reason, the amount of stress that will be borne by the individual tooth without severe pain or even injury is often reduced to one hundred pounds, or even less, in a state of apparent perfect health. Theoretically, the peridental membrane of each individual tooth should be able to sustain it against the entire muscular strength of the jaws, for otherwise they would continually be liable to injury. This is certainly true of the animals generally. But the study of this point in man has led to a conclusion that from the use of soft foods habitually the peridental membranes are so weakened, or have become so sensitive, that they will not bear this stress, and that in the use of his teeth man continually limits his muscular exertion to the amount of force productive of pain in the peridental membranes ; therefore, a little more force than that usually required by the food he uses is productive of pain. This has been generally true in trials of the force of the bite, and gives rise to the wide variations noted in my papers.

This fact should be kept strictly in mind in all dental operations requiring much force. It often happens that teeth requiring fillings have been sensitive from exposure of the dentine, and, for that reason, their use in chewing food has been avoided for some time ; such teeth are sensitive to the mallet by reason of changes in the peridental membrane occurring because of disuse. If these be filled temporarily with some plastic for the relief of sensitiveness, and the patient directed to bring them into full use, and gradually to something more than full use, accustoming the peridental membranes to bear heavy stress, they will be found, after a few weeks or months, to bear the mallet with little or no pain. This is a practical point of great worth in the treatment of children, as well as adults.

The anchorage of bridges with broad molars on small bicuspid roots also comes in for consideration along this line of thought. I have already witnessed the absorption of several roots of bicuspids that was clearly attributable to the over-stress upon a bridge that was too large for the sustaining power of the membranes depended upon.

Filling-Materials.

Gold and amalgam are the only filling-materials yet subjected to close experimental study, and the study of neither of these has been in anywise complete. Amalgam cannot be considered in this paper. Members of this association have made fillings, experimentally, for the further study of gold. These studies have a thoroughly practical object, the development of facts, the knowledge of which will enable us to produce better fillings in the future. As dentists we have known accurately but little of the physical properties of gold. A few have studied its chemical properties, or its relations with other elements, sufficiently to enable them to obtain the metal in a remarkable degree of purity, but the principal discovery we have made as dentists has been of the welding property of the metal. The nature of this property was very actively discussed in our local meetings twenty-five years ago. Some of you may remember a paper which I presented to this society on the subject in 1874. This seems to have ended that discussion so completely that I sometimes suspect that the true explanation of this property has been lost sight of by many in the profession. I am quite sure that I find dentists using cohesive gold as non-cohesive, and sometimes endeavoring to do the reverse thing.

The object of experimental studies of the physical properties of gold now in hand is, first, to establish the correlation that exists between the strength of gold fillings, the teeth in which they are placed, and the stress brought upon them in mastication, and incidentally, but by no means of less importance, to see whether or not one man understands the efficiency or inefficiency of his own or of his neighbor's methods of packing gold. We ought to be able to find a mean of density and strength of gold fillings best adapted to the purposes intended, and to which every one should make reasonable approach, understandingly, in the ordinarily favorable case. In this we have had nothing to which we could refer as a standard; we have had no studies that gave us any basis for finding the strength required or the strength attained. We have had no fixed method of teaching. The whole matter has been left to clinical observation. Without in the least disparaging the value of clinical observation, this cannot serve as a sufficient guide to us any more than it can continue to serve as a guide to the civil or mechanical engineer in the construction of bridges or engines. In these days the engineer must know how to apportion the strength of his material to the load it must bear. Just so we, as dentists, should become able to adjust the strength of our fillings to the stress that shall come upon them in mastication, and be able to teach this in some definite demonstrable way to students. When this has been done and has become general, we will hear of less difference of opinion as to what should be classed as successful operations.

A very intelligent dentist, Dr. Brown, of Duluth, only a few years ago estimated the average endurance of fillings at three years; others would place it at a longer period, but still very limited, and gentlemen will be found who will be able to place the average endurance of fillings made by themselves at fifteen or twenty years, including all classes, and with good reason. In the estimation of the one, a filling that has endured three years is fairly successful, while in the estimation of the other it has been a failure. All of these are taught in the same school of experience, but one has become more exact than another, and yet is without a basis upon which he may communicate his plans to his associates. Making all due allowance for the personal equation which must ever exist, the divergence is too wide, and cannot be greatly narrowed until we have a basis, not of clinical observation alone, but attested and demonstrable facts as a guide in teaching.

Now, what has been shown? First, It has been shown that as between gold, as made into fillings, and the teeth, the teeth are harder and stronger than the gold in all cases that have come under my instrumental observation. That the teeth are harder than cast or hammered gold; that we can in teeth make gold fillings that are hard enough to withstand the pressure of any ordinary stress of mastication; that we often do, many of us at least, make gold fillings that are frail, too frail to serve the purposes intended. It has also been suggested that there are certain means at our command by which, if properly used, this can in large measure be prevented; not a cure-all that is to make all things easy, but rather a pointing to a way by which, through careful work on right lines, we may slowly approach a more scientific plane and a higher standard of excellence in our manipulation. Plans by which we may test our operations, weigh them, try their strength, and judge of their merits, and learn wherein we fail and our measure of success.

Among the fillings presented to me from members of this society, made in steel dies for experimental purposes, there are wide variations in density and rigidity, or in weight and endurance of stress. The densest filling reached 18.47* volumes out of a possible 19.4, which I adopt as the measure of absolute density. The strongest filling required two hundred and fifty pounds to reduce its length two per cent. The lightest filling reached only 12.53 volumes, and fifteen pounds' stress reduced its length two per cent. In other words, the one has a density of 95.2 per cent., while the other has a density of a little less than 65 per cent. This variation must be regarded as very wide. Among the others we find the percentage of density scattered all the way between. Still I can say truly that this is as good a list of experimental fillings as any I have obtained, in some respects better; and just here, for fear some one should overlook it, I wish to say emphatically that the instrumental test which I report is but one, and not really the most important test of the worth of a set of fillings. The die, or mold, in which these fillings are placed has been carefully polished with emery, which has left fine lines upon its interior surfaces in the hardened steel. A filling that has been perfectly adapted to these walls in all of its parts will show these lines unbroken upon its surface. Without this adaptation in very fair degree, a filling is inferior no matter what its density or strength. In the count of excellence in operating this is, and must always be, the first count. While density and rigidity must ever remain secondary to adaptation, it still holds that rigidity is a necessity to endurance, and it is especially the degree of rigidity attained, and attainable, that is the subject of this investigation.

---

*The weight of gold of maximum density equals 19.4 equal volumes of distilled water in weight. If not of maximum density it equals the weight of a less number of volumes of distilled water. This is the measure of its specific gravity.

Table Showing the Specific Gravity and Rigidity of Experimental Gold Fillings.

By Whom Made.	Number.	Specific Gravity.	Pounds stress to reduce length.		Per Cent. Reduced by 350 Pounds.	Description.
			2 per cent.	5 per cent.		
Dr. Northrop . . .	121	16.26	225	300	6 %	Watt's Crystal Gold. Abbott mallet.
Dr. Northrop . . .	121½	17.22	185	280	7	Williams's Cylinders, semi-soft. Abbott mallet.
Dr. C. B. Parker . .	135	16.02	52	95	29	Rowan's Decimal Gold. Hand-mallet.
Dr. John J. Nash . .	143	16.82	120	280	8 %	S. S. White's Velvet Gold. Abbott mallet.
Dr. F. C. Walker .	129	16.23	125	210	12	Rowan's Extra Pliable Gold. Hand-mallet.
Dr. F. T. Van Woert	148	17.22	125	255	14	Williams's No. 4 Soft Gold. S. & L. mallet.
Dr. F. T. Van Woert	148½	18.00	125	252	11	Williams's No. 4 Soft Gold. S. & L. mallet.
Dr. Wm. Jarvie . .	141	17.30	140	230	16	Kearsing's Cohesive No. 4. Hand-mallet, as in building when exposed to stress.
Dr. Wm. Jarvie . .	142	12.53	15	35	56	Kearsing's Soft No. 4 Foil. Hand-mallet, as usual in filling teeth.
Dr. Wm. J. Turner .	128	13.83	25	40	56	Non-Cohesive Foil. Hand-pressure, with ordinary force in operating.
Dr. Wm. J. Turner .	127	13.21	35	70	47	Cohesive Foil Cylinders. Hand-mallet.
Dr. J. C. Nisley . .	116	17.19	165	350	5	Semi-Cohesive Foil. Hand-mallet. No statement as to annealing.
Dr. J. C. Nisley . .	137	17.47	175	350	5	Kearsing's Soft Foil. Hand-mallet.
Dr. A. J. Schofield .	149	18.36	250	.....	3 %	Cohesive Foil No. 4 folded to 24. Mechanical mallet.
Dr. J. B. Littig . .	138	16.54	100	190	22	Cohesive Foil No. 4 folded to 24. Mechanical mallet.
Dr. J. B. Littig . .	138½	17.41	60	80	42	Non-Cohesive Foil No. 4 folded to 24, with mechanical mallet.
Dr. E. T. Darby, *Philadelphia* . .	114	17.34	145	320	8	Abbey's Soft Foil. Part annealed.
Dr. E. T. Darby, Jr.	114½	17.10	95	160	23	No. 20 Cohesive Foil, ordinary force.
Dr. S. G. Perry . .	112	17.94	85	160	18	Abbey's Soft Gold No. 4, half sheet folded into a ribbon of width of cavity. Not annealed; hand-pressure.
Dr. S. G. Perry . .	113	18.74	85	155	16	Morgan & Hastings' Extra Cohesive No. 20, cut in ribbons; annealed to full red. Hand-mallet.
Dr. J. F. P. Hodson .	115	18.05	150	235	14	Watt's Crystal Gold No. 1. Annealed lightly; hand-mallet; very small plugger, with ordinary force of hand-mallet.
Dr. J. F. P. Hodson .	115½	17.76	95	135	27	Same as No. 115, except that hand-pressure was used.
Dr. J. F. P. Hodson .	130	18.47	130	190	12½	Williams's Cohesive Burnished Cylinders No. 1 and 1½. Very small, serrated plugger with hand-mallet; ordinary force in teeth of good quality.
Dr. J. F. P. Hodson .	130½	16.10	70	100	30	Same as No. 130, except that hand-pressure was used.
Average		16.79				All experimental fillings.
Average		16.48				First group of 18 experimental fillings.
Average		15.94				Old gold fillings. (See list of old gold fillings, page 307.)

Fillings Received after the Above was Made Up.

Dr. D. N. McQuillen	147	17.25	140	230	13.72	Abbey's soft gold No. 4, half-sheet folded into ribbon of width of cavity; unannealed; hand-pressure of ordinary force.
Dr. D. N. McQuillen	147½	17.87	160	250	7.63	Morgan & Hastings' Extra-Cohesive No. 20. Hand-mallet, ordinary force.

In this list of twenty-four experimental fillings there are five that reach a density of eighteen volumes or over. These are remarkably heavy fillings, but not heavier than I have myself produced experimentally by means which seemed to me applicable in the mouth. Yet in later experimental work I have been led to doubt whether or not the malleting might be overdone, that is, a degree of force used that was inapplicable in actual work in the mouth. It is exceedingly easy to do this in experimental work out of the mouth, and in this way bring about a deception. One gentleman who furnished me with very dense fillings remarked that it was his habit to lay on the pressure until his patient winced, and in this case the patient did not wince, and possibly the malleting might have been somewhat heavier than usual.

On the other hand, one gentleman who has furnished me with some of the lightest fillings in the group, as well as one among the heavier, stated that it was his habit and effort to fill the cavity with the least practicable amount of gold, "caring more for adaptation and finish than for density and strength." One of his fillings reached a density of but twelve and one-half volumes, and was shortened two per cent. by fifteen pounds' stress, and five per cent. by thirty-five pounds. A filling so frail as this will be condensed upon itself (compacted into smaller compass) by the stress of mastication in the chewing of beefsteak, and if the surface alone is made hard by malleting cohesive gold upon it, as suggested, the margins will fail to readjust themselves anew to the margins of the cavity; the filling, if not pushed out of position entirely, will absorb animal matter, and caries will inevitably recur. I wish to say distinctly, that experimental research has taught me a new view of this point. A filling wholly of non-cohesive foil, if confined by four walls, may be frail and may condense upon itself, and still the margins are so soft and adaptable that the force which condenses it continually secures the readaptation of the margins. Frail fillings veneered with cohesive gold lose this property, and soon become valueless. It therefore becomes clear that if the filling is to be made mostly of truly non-cohesive gold, unless it is very well compacted, it is better to finish it with non-cohesive gold.

A number of fillings have been furnished that are reported as being made of soft gold that have acted under stress as cohesive gold of good quality. I am at some loss to know what the gentlemen have meant by the expression, "soft gold." I know very well that many in the profession designate gold having certain properties, either real or fancied, no matter which in this connection, as soft gold, while the gold is really cohesive gold and will make a truly cohesive filling. The differences between cohesive and non-cohesive fillings, when placed under stress, have been so pronounced that there is no mistaking the one for the other. A truly cohesive filling of fair density acts precisely as cast or hammered gold, enlarging in circumference as it is shortened, its sides remaining smooth. Non-cohesive fillings, on the other hand, break and split up, showing ragged sides, the natural result of non-cohesion. This raggedness may be in some degree lessened, but not prevented, by laying the folds, cylinders, or blocks flat instead of placing them on end in the cavity. Here I should state the proposition that non-cohesive gold fillings are adapted only to cavities with four good side-walls, and that they depend for their strength upon the lateral support of these walls, therefore pressure tests of the naked blocks do not give a proper or correct estimate of their strength. At the same time, if their density is so low that they will be considerably condensed upon themselves by the stress of mastication, they must become inefficient as fillings, especially so if veneered with cohesive gold. Still, a frail non-cohesive filling must always be better than a frail cohesive filling, and this is an important pointer in the treatment of occlusal surfaces for children, in cases where the most efficient force cannot be used. A cohesive filling that is condensed upon itself by stress of closure of the jaws must inevitably lose its marginal adaptation, while a filling made wholly of non-cohesive gold does not necessarily do so. This does not apply to non-cohesive gold fillings veneered with gold when the density and strength is sufficient.

I wish to be clear in conveying the meaning of the expression, "*condensing upon itself;*" a filling low in density, even the naked block, will, when pressure is brought upon it, shorten in length without increasing in transverse diameter; this I call condensation upon itself; the gold is simply rendered more compact. This will occur to a certain degree, and then the transverse diameter will begin to enlarge, and for a time the two will go on together. Now it will become clear, I think, that even four good walls is no protection to such a filling against condensation, or, if of cohesive gold, against loss of marginal adaptation. The degree of density required to completely overcome this is not certainly determined, but with cohesive gold it is in the neighborhood of a density of fifteen volumes. Indeed, I may say that it has been distinctly observed from fifteen down. These observations, together with the low degree of stress required for the condensation of fillings of this density or less, impresses me with the idea that a lower density than fifteen is inadmissible in any gold filling, whether of cohesive or non-cohesive gold. Another important observation bearing on this point will be given later. It must be recognized that fillings exposed to the stress of mastication require more rigidity than those not exposed to stress.

The question has been repeatedly put to me, "Do these experimental fillings properly represent the density attained in fillings placed in teeth?" In order to test this matter in a thoroughly practical way, I made a request of a number of gentlemen that they send me old gold fillings that had been placed in teeth and lost from any cause, together with their history. I made this request of the president of this society along with the request for experimental fillings, but none have come to hand. I have found it exceedingly difficult to obtain these fillings, and have not a great number, but what I have I regard as very valuable in this connection. I give a tabulated list of them :

By Whom Made.	Number.	Weight.	Specific Gravity.	Duration in years.	
Dr. H. J. McKellops	1	3.128.9	17.10	20	First upper bicuspid, two-thirds of crown built on.
Dr. J. N. Crouse	2	2.396.8	15.60	20	Third lower molar, occlusal surface, lost by disease of peridental membrane; protection perfect.
Dr. G. V. Black	3	1.197.8	16.40	10	Third upper molar, mesio-disto-occlusal surface; protection perfect. Lost from disease of the peridental membrane.
Dr. C. N. Johnson	4	.568.5	17.60	½	Occlusal edge of lateral incisor built on. Lost by breakage of wall.
Unknown Furnished by Dr. Johnson.	5	896.2	14.83	8	First lower molar. Occluso-lingual cavity. Lost by leakage and breakage of wall.
Unknown Furnished by Dr. Cushing.	6	280.0	15.21	1	First lower molar, disto-occlusal filling. Lost by leakage and breakage of disto-lingual angle.
Dr. G. V. Black	7	584.6	16.12	7	Second lower molar. Occlusal filling in abraded surface. A thin filling, and removed because it had worn through, exposing the dentine.
Dr. G. V. Black	8	692.4	14.98	15	First lower molar, mesio-occlusal surface, for a slight little girl ten years old. Lost by leakage at mesio-occluso-lingual angle.
Dr. G. V. Black Presented by C. B. Powel.	9	174.3	16.00	19	Central incisor. Mesial surface, including angle; protection perfect. Lost by disease of the peridental membrane.
Dr. C. B. Powel	10	162.5	16.25	3	Mesial surface of central incisor, including angle. About half of the filling broke away.
Dr. C. B. Powel	11	1.435.6	15.20	3	Five fillings in cavities in artificial teeth made by hand-pressure. Lost by accidental breakage of the teeth.
Dr. G. V. Black	12	208.4	16.00	2	Mesial surface of central incisor. Filling leaky, and was found to have slight movement.

When I received the first installment of experimental fillings from New York, eighteen in number, they, with the old gold fillings collected, were examined in precisely the same way as to their specific gravity, and with the same instruments. The average specific gravity of the experimental fillings was 16.48, while the average specific gravity of the old gold fillings was 15.94, a difference of fifty-four one-hundredths of a volume. However, I have since received six more experimental fillings, all of which are of very high specific gravity, and this places the experimental fillings eighty-five hundredths of a volume heavier than the old gold fillings.

An examination of the history of the old gold fillings shows some of them to have been placed in positions in which it was difficult to obtain great density. The first on the list, made by Dr. McKellops, weighs 3.129.9 grams, forty-nine grains, considerably more than an eighth-ounce of foil, if we include necessary loss in trimming, and was built upon the broken-down crown of a bicuspid, the membrane of which would be apt to complain seriously from the malleting. Yet the density attained was 17.10, which is thirty-one hundredths of a volume above the average density of the experimental fillings; this filling stood active usage for twenty years.

No. 2 is by Dr. Crouse, of Chicago, and was a large occlusal filling in the third lower molar; this filling had stood usage for twenty years, and was deeply worn by the cusps of the upper molar. The tooth had been perfectly protected, and was finally lost from disease of the peridental membrane. As to occlusal surfaces, it is next to the most difficult position in which to attain the maximum density, the third upper molar only being more difficult. Its density was 15.60.

No. 3 is by myself, mesio-occluso-distal cavity in the third upper molar, and has a density of 16.40; the tooth was lost by disease of the peridental membrane after the filling had served eight years, giving perfect protection.

No. 4, by C. N. Johnson, of Chicago, was built on the occlusal edge of a lateral incisor, and has a density of 17.60; lost by breakage of wall. No. 5, density 14.83, endurance about eight years; and No. 6, density 15.21, endurance one year, are by unknown persons; practically both were lost from leakage and breakage of walls, under which fresh decay had started. No. 6 was built on a seat of gutta-percha.

No. 7, by myself, I regard as specially instructive. It was built in the worn and cupped occlusal surface of a lower second molar. As the upper teeth occluded close into the cupped surface the filling was very thin, and in seven years was worn through in its center, re-exposing the dentine, and was removed for that reason. The wearing surface was smooth and polished at all times, but the filling was much too soft. Its specific gravity was 16.12. I found upon test that this gentleman closed his mouth with a force of a little over two hundred pounds. I made some proximate fillings for him, the first of which did not stand, but he has fillings now upon which he can deliver his two hundred pound thrust without fear.

No. 8, by myself, was made in the mesio-occlusal surface of a lower first molar, for a slight little miss ten years old, over a pulp-capping. This must be regarded, I think, as a difficult case in which to secure good density. The density attained was 14.98. This filling did service for fifteen years. I saw it frequently and was proud of it, and the patient was particularly proud in saying she had never lost a filling, though she had a goodly number in her teeth. But lately I noticed that this filling was leaking at the mesio-lingual angle. More stress than it could withstand had been brought upon it, and caused a portion of the margin to open. I carefully washed the surface of this filling with ether to remove the animal matter, and laid it on a mica slab over a Bunsen burner, and gradually heated it, and found that a portion of the gold next to where the leak had occurred had absorbed animal matter. I find that fillings of the density of 15 and below are liable to this. Why shouldn't they? they contain twenty per cent. or more of air-spaces. Of course, the surface of such fillings may be rendered impervious in the finishing, but if a leak occurs moisture enters more or less into the substance of the filling.

I need not follow through a special description of the remaining old gold fillings; they may possibly be regarded as too few in number to place a judgment as to the value of experimental fillings as representing fillings placed in teeth, but they show that the experimental fillings are not far wrong in the main, while pointing to probable over-malleting of some of them. Does this teach us that we are generally making our fillings dense enough? From this set of old fillings I should say, No. My own fillings have been too soft in the past, and this examination of just a few that are well known to me confirms the conclusion at which I had arrived by clinical observation, aided by experimental work, before these fillings were examined. It will enable me to improve upon my past work in this particular. My hope is that it will enable the profession generally to improve their operations.

It had been my wish to obtain from the gentlemen making experimental fillings such an account of their methods of manipulation as would enable me to express those methods that produced the best results, and compare them with other methods. Too few have given careful account of method to render this available at present, but certainly careful study will soon enable us to put these plans in language that will be understood. It is certain that the differences in *density* seen in these lists of fillings is due in but small degree to the amount of physical force used in their condensation. Differences in *rigidity* are more directly due to the force used.

I have made a good many experimental fillings, recording carefully the steps in each operation, and from these I am able to deduce some general propositions.

To make a very dense filling *does not* require very heavy malleting, but does require that the gold be used in thin pieces, carefully and evenly laid, and that the malleting be complete over the surface of each piece ; such a filling will not be very hard.

To make a hard rigid filling *does require* heavy malleting in addition to care in the laying of the gold, if the filling is to show great density as well as rigidity.

It occurs, therefore, that a very dense filling, one of high specific gravity even of cohesive gold, may be soft, and will yield readily to stress, and is so if the malleting has been light ; while on the other hand, a filling that has been made very rigid by heavy malleting may be of less density because of less care in the placing of the gold, or from using the gold in pieces that are too large, causing numerous air-spaces to be bridged over. Again, heavy malleting with a smal point may cause the instrument to pit the condensed gold deeply, and many of these pits will be bridged over, which will reduce its specific gravity. Cast gold, if the ingot has been well formed, cannot be greatly increased in density by hammering, but its rigidity is greatly increased. Anneal it, and the increased rigidity is gone at once without materially changing the density. The hammer will restore the rigidity. By the use of our mallet and plugger points, malleting the gold into the cavity bit by bit, we are enabled to make pure gold more rigid than it can be made from the ingot upon the anvil with the hand hammer.

To make a very dense filling, the plugger-point should be proportioned to the force of blow employed. It is difficult to express this proposition, for the reason that no means has been developed of measuring the force of blow. Even the mechanical mallets are too variable, one with another, to serve as a safe guide. With the blow I habitually use in operating, I find I can obtain the densest filling with a plugger-point about two one-hundredths of an inch square,—*i.e.*, an area of four one-hundredths of an inch. A smaller point pits into the gold too much, so that these pits bridge over. With larger points the condensation diminishes with the increase in size, unless the force of the blow be increased in proportion. If in any case the malleting must be reduced in force, the size of the point must be reduced, if the density is to be kept up to the standard.

In order to utilize the density and rigidity of filling-material to the best advantage, certain rules as to the preparation of cavities must be observed. We cannot make a cone, set it on its small end, and apply stress to the larger end, and expect the small end to support the stress that would be borne if the form was of one size from one end to the other. It will inevitably be condensed at its smaller end. We can no more support occluso-proximate fillings that present broad surfaces to the occlusion upon a narrow shelf for a seat at the gingival wall, than we can make the cone support heavy stress upon its little end. If we would have our occluso-proximate fillings stand, we must broaden the seat of the filling which must support the structure, to such an extent that it may bear the load that will be brought upon it. To do this, an additional seat must be cut in the central part of the crown of the tooth. Strict experiment as to the strength of gold shows this too plainly for any mistake to be made, and when it is generally done, and the gingival walls made flat and broad and the interproximate space of proper shape, the difficulty of making proximate fillings stand will mostly be a thing of the past.

It isn't anchorage that needs such close watching, but something upon which the filling may rest with broad enough base so that it may not be condensed upon its seat. When this is done, but little further anchorage is required.

But, gentlemen, I have spoken too long ; I cannot now go into the details of cavity preparation ; I can only say that this must be systematized so that each part of the filling may properly support the stress brought upon it.

Now, are there found in the physical properties of the teeth, of filling-materials, the force of the occlusion of the teeth, and the forces employed in manipulation, facts which, as a better understanding of them is attained, may be so systematized that they will be of benefit to the dental profession and through them to humanity?

PYORRHEA ALVEOLARIS.

BY EUGENE S. TALBOT, M.D., D.D.S., CHICAGO, ILL.

(Read before the Academy of Stomatology, January 28, 1896.)

PAPER NO. 2.

MUCH literature of the present disease is chiefly given to its name, with the intent of fixing the views of the particular name divisor on dental science.

The old uphill scientific blunder of replacing names with meaning fixed by usage, by others better coined from a linguist's standpoint, leads only to the accumulation of names.

Riggs's disease is a title too firmly fixed to be dislodged by terms limiting the pathology of the disease but expressive merely of temporary phases of dental thought.

Theories as to the etiology, pathology, and treatment of Riggs's disease are too numerous, discordant, and fleeting to merit lengthy discussion, except as they seemingly express dominant thought. The latest theory advanced is the influence of the dyscrasic or constitutional abnormal states so much discussed in medicine, which has found expression in dental pathology in the uric-acid or gouty theory advanced by Dr. Reeves, and amplified by Dr. Peirce,* of Philadelphia. This has found support by able practitioners.

Clinic tests alone should be applied to all theories. Applying these to the uric-acid or gouty theory, I found that in but few cases of the uric-acid diathesis could any evidence suggesting pyorrhea be detected.

According to Peirce, when uric-acid salts attain a certain percentage they are eliminated from the blood through the walls of the capillary vessels, passing out associated with lymph. The tissues become the seat of this salt exudate and permeate the connective tissue ; this tissue presenting the greatest density and least degree of vascularity. To test the validity of this claim of Dr. Peirce, I had instituted two independent series of examinations, one at the Columbus Medical Laboratory, where special cases were examined, the other at the Laboratory of the Northwestern University Woman's Medical School, to which teeth were sent as they were removed from the mouth. One hundred examinations were made in one, and one hundred and fifteen in the other. Teeth were obtained from three institutions in Chicago which make a specialty of extraction. I was careful in selecting only diseased teeth with calcic deposits. Of the one hundred examinations made at the Columbus Medical Laboratory, fifty were of specimens of calcic deposits from my patients ; fifty were obtained at the institutions just mentioned, and therefore have no history.

The one hundred examinations at the laboratory of the Northwestern University Woman's Medical School have no history except that they were good cases of pyorrhea with plenty of calcic deposits, loose in the sockets when extracted.

The three tests recommended by Dr. Peirce were used in both laboratories :

1st. The hydrochloric-acid test.
2d. The dry distillation test.
3d. The murexid test.

Of the one hundred and fifteen examinations made at the Northwestern University Woman's Medical School by the first test, in only two cases were found the needle-shaped crystals, and one in which there was a slight resemblance of uric-acid crystals.

By the dry distillation test thirteen gave no reaction from ammonia, and in seven the reaction was slight. The remaining eighty gave a decided reaction.

By the murexid test four gave a slight murexid color, but the remainder gave no reaction.

Special examination was made of twelve of these teeth by the addition of strong hydrochloric acid, warming, decanting the acid, and washing with water. These gave no reaction by the dry distillation tests for ammonia. Two gave a slight reaction by the murexid test.

In examination of three uric-acid diathetic women over forty, uric acid was not detectable either by the murexid test or microscopically.

---

* *International Dental Journal*, vol. vi, page 367.

The examinations made in the Columbus Medical Laboratory are still more interesting, since among them are specimens from patients whose history could be obtained, and the results easily noticed.

Of the fifty obtained outside, eight gave positive results from all three tests. The other forty-two were positive by dry distillation, and negative by the murexid and microscopical tests. Of the fifty patients, thirty-eight females and twelve males, thirty-two are over forty years of age, twelve over thirty years, and six over fifteen years.

Twenty-six have uric acid to a greater or less extent.

Nine suffer with indigestion, seven of which are subject to sick headache.

Thirty-four have rheumatism.

Six are English, and four of these have the true English gout; the other two have rheumatism. All are positive with the dry distillation test. All are negative with the murexid test. Forty-nine are negative with the microscopical test. One shows needle-shaped crystals, but not uric acid. It is a singular fact that the cases examined in both laboratories, and in which there were uric acid and gouty histories, gave negative results.

Examination of calcic deposits by the dry distillation test shows that out of two hundred and fifteen cases all, with the exception of the twelve cases which have been treated to remove all of the nitrogenous material, responded. The twelve cases so treated did not respond, since all nitrogenous compounds in and about teeth (even the saliva when burned to an ash) will produce ammonia. This test is of no value. By the murexid test only twelve out of the two hundred and fifteen gave a positive reaction. By the microscopic examination only ten showed crystals.

One of the chemists who made the examination is positive that they are uric-acid crystals; the other is not, since lime phosphate crystals resemble them so minutely as to be with difficulty distinguished. Admitting that all of those cases reported be uric acid, it is barely possible that it might come from the blood direct, since blood-stains are always found upon the deposit either from extraction or in removing it from the teeth in the mouth. Even if all the cases reported from both laboratories be uric-acid deposits, this is a small percentage (about five per cent.) of cases in so large a number, and far from supporting the broad claim that the uric acid is the chief cause. The uric-acid deposits are probably nothing more than an expression of the condition of the blood, and not the cause of the disease.

If this theory, moreover, were correct, the deposits, which are in the capillaries in a liquid state, surrounding the teeth, would attack all the teeth at the same time, and deposit equally or nearly so around the root of each tooth, which never occurs.

Certainly uric acid cannot produce that peculiar form of pyorrhea in which no deposits are found and which is so frequently observed.

Again, there are many who suffer from uric-acid poisoning for years, yet do not have tartar or serumal deposits. I have had uric-acid poisoning for ten years, but have an exceptionally healthy mouth.

The uric-acid poison theory does not account for those large, dense deposits frequently observed around the margins of cavities, protruding fillings, or points of irritation, and in no other locality in the tooth. The uric-acid or gouty diathesis theory is not in harmony, moreover, with clinical observation, as I shall show later on.

Since pyorrhea is so prevalent among our patients, and since so few suffer with uric-acid poisoning, causes other than a gouty diathesis must be looked for.

Below are the official reports :

[*Copy.*]

LABORATORY OF THE NORTHWESTERN UNIVERSITY WOMAN'S MEDICAL SCHOOL.

JEROME H. SALISBURY, A.M., M.D., Professor of Chemistry.

CHICAGO, December 14, 1895.

DR. EUGENE S. TALBOT :

Dear Doctor,—I have examined the calcic deposit from one hundred teeth by the three tests which you suggested,—viz, dry distillation, the murexid test, and microscopic examination of the residue after evaporation with hydrochloric acid.

By the dry distillation test thirteen gave no reaction for ammonia, and in seven the reaction was slight. The remaining eighty gave a decided reaction.

By the murexid test four gave a slight murexid color, but the remainder gave no reaction.

Under the microscope I saw in two cases needle-shaped crystals, and in one some crystals which somewhat resembled the crystals of free uric acid. In the other specimens I found no indication of uric acid.

I have examined twelve other teeth by same tests, except that I preceded the dry distillation by the addition of strong hydrochloric acid, warming, decanting the acid, and washing with water. These gave by dry distillation no reaction for ammonia. By the murexid test two gave a slight reaction.

The specimens of calcic deposit from the cases of Mrs. T., Mrs. C., and Mrs. H. gave no indication of uric acid by either the murexid reaction or microscopic examination.

As a test for uric acid the method of dry distillation and testing the gases evolved for ammonia is, in my opinion, entirely inconclusive. The reaction will, of course, be given by most nitrogenous organic matters, and some of these will always be present in the material taken from the teeth.

The murexid test is not entirely conclusive, as there are a few other substances that give a similar reaction, but they are not very likely to be present in the calcic deposit on the teeth. The murexid reaction obtained in the tests which I made may have been given by the dried blood, as blood sometimes contains enough uric acid to give a decided reaction.

The discovery of needle-shaped crystals by the microscope cannot be regarded as positive evidence of the presence of calcium urate, because calcium phosphate crystallizes in crystals of similar shape.

Yours very respectfully,
(Signed) J. H. SALISBURY, Professor of Chemistry,
Northwestern University Woman's Medical School.

[*Copy.*]

COLUMBUS MEDICAL LABORATORY.

Columbus Memorial Building, Suite 1403, 103 State Street. Tel. Main 3856.

A. GEHRMANN, M.D., Bacteriologist; JNO. A. WESENER, Ph.C., M.D., Chemist; W. EVANS, M.D., Pathologist; WM. M. HARSHA, M.D., Secretary.

CHICAGO, December 20, 1895.

DR. E. S. TALBOT, No. 1205, 103 State Street, Chicago :

Dear Doctor,—I beg leave to report as follows :

On the specimens of incrustations from one hundred teeth and calcic deposits sent the laboratory the tests employed were : No. 1, dry distillate ; No. 2, murexid ; No. 3, crystals.

Each of these tests were employed in each of the cases. One hundred responded to test No. 1. Eight responded to tests Nos. 2 and 3.

Test No. 1 gives a reaction with any organic compounds giving ammonia as a decomposition product. Saliva ash gives the reaction.

The conclusion to be drawn then is, that eight specimens of this one hundred contained uric acid and urates.

Very truly,
Dr. J. A. Wesener,
Chemist to Columbus Medical Laboratory.

Ten years ago* I published some observations on pyorrhea which it was hoped some one proficient in microscopy would take up and pursue the investigations to the end. I have never observed any allusion to it. Among the points then made was, that pyorrhea was on the increase, that a large majority of patients suffered more or less from it, and that modern dentistry had most to do with the cause.

I still hold these opinions, since clinical experience in the different asylums of this country and Europe, as well as close observation of my office patients, has given me a broad range to study the etiology of this disease.

Dr. E. Magitot in 1867 published the most complete paper upon this subject, describing the disease in its progress to the end, but says that the gum, being in all cases attacked subsequently only, is not the real seat of the lesion. The disease with which we are occupied, he says, "seems essentially characterized from an anatomical point of view by a slow and progressive destruction of the periosteal membrane,—a destruction of an inflammatory character, of chronic progress, proceeding from the neck to the end of the root, and leading, without fail, to the loss of the tooth. This special feature, its mode of origin, and the precise seat of the lesions, seem to justify the name alveolo-dental periostitis. But, notwithstanding its primary origin in the periosteum and its complications with the gum and bony alveolar wall itself, the study of the successive morbid phenomena does not allow us to admit, as various authors have claimed, that these parts are originally the seat of the disease." I believe Dr. Peirce takes the same view. I take just the opposite:

First, that the gum is the first tissue attacked; and

Second, that these parts are originally the seat of the disease.

When a tooth has been extracted that has been associated with pyorrhea, clinical observation shows that the margin of the peridental membrane has changed its locality. Instead of being in its normal position at the neck of the tooth, it has receded in a more or less irregular line toward the apex of the root. The extent of this recession depends upon the duration and power of resistance of the disease.

The membrane, instead of being thin and of a pink color, is quite thick and of a deep red. The inflamed membrane may extend through the entire length of the root or in circumscribed localities. The space upon the root made vacant by the destruction and loss of the peridental membrane may be quite clear and smooth, or it may possess calcic deposits. These deposits may consist of a uniform ring extending around the entire tooth, or circumscribed masses of deposits may be located at different points about the root. As the membrane recedes, the deposits follow after it upon the root or roots.

---

* Dental Cosmos, 1886, vol. xxvi, page 689.

Between the border of the calcic deposits and the peridental membrane is a space one to two lines in width, where the root, or roots, of the tooth is perfectly smooth ; this is the pus line of clear, smooth tooth-structure, and is nearly always situated between the calcic deposits and the peridental membrane, showing that the calcic deposits are not always found in the membrane as Dr. Peirce claims. 2. The space upon the root of the tooth between the peridental membrane and the neck of the tooth, including the calcic deposits, is bathed in pus. This disease, an inflammation of the gums, is due to irritation from constitutional and local causes.

Constitutional causes are tartar, from mercurial salivation, potash iodid and other drugs, syphilis, loss of vitality, locomotor ataxia, paretic dementia, and the menstrual nisus. In neurotic and degenerate classes, as a whole, pyorrhea exists to a greater extent than in the more healthy classes. In any and all of those diseases in which systemic disturbances produce trophic changes, this disease is present.

Local Causes.

As has already been said, modern dentistry is producing more pyorrhea than any other one cause. Some cases result from infection, from micro-organisms, application of the rubber-dam, clamps, wedging the teeth, correcting irregularities, sharp edges of decayed or filled teeth, protruded fillings, spaces between teeth, crown- and bridge-work, over-stimulation in the use of the toothpick, artificial teeth, more particularly ill-fitting plates, injuries, tartar, accumulation and decomposition of food and collections around the necks of teeth, tobacco and everything of a foreign nature, as observed in the mouths of idiots, imbeciles, epileptics, and all individuals who do not take care of the teeth. The result of irritation from constitutional and local causes is inflammation.

Light is thrown upon this subject by a careful study of the anatomy and physiology of the parts involved. We have the root or roots of a tooth on the one hand, and the bony structure of the alveolar process on the other, and between the two resisting walls we have the peridental membrane, composed of fibrous elastic connective tissue, which gives nourishment to both the tooth and the alveolar process. The alveolar process is a transient, bony structure, simply for the purpose of holding the teeth in place after they have erupted. The gums or mucous membrane which covers the alveolar process, and which is united with the mucous membrane throughout the mouth, connects with the peridental membrane at the margin of the process. That the lymphatic system is richly developed at this locality is demonstrated by the fact that when the temporary and permanent teeth are lost, the alveolar process absorbs. No structure of the body is similarly situated as the peridental membrane. The structure of the tooth not changing its form or size, sends very little nourishment into the cementum.

The peridental membrane obtains its blood-supply from the arteries at the apex of each root, just before they enter the foramen and through the alveolar process, but the largest amount passes through the gingival border of the gum.

According to Black* these "capillaries run longitudinal from either end of the root toward the center, giving off branches which enter the alveolar process, but not the cementum, because of the peculiar locality of the membrane." May not the anatomical position and a physiological action on this membrane have something to do with the disease?

The gums are rarely found in a healthy condition. They may become inflamed from either constitutional or local causes mentioned above. If the cause is removed early and antiseptic and astringent washes used, together with the stimulating effect of the tooth-brush, the gums will return to a healthy condition. The peridental membrane is never invaded by pus-germs so long as it is in a perfectly normal state. If, on the other hand, inflammation of the gums, due to either constitutional or local causes, persists, it will extend to the capillaries of the peridental membrane, causing inflammation and stasis of blood in that direction.

The peridental membrane has not lost all of its source of nourishment, although the greater part is cut off; its vitality is thus impaired.

When inflammation of the peridental membrane takes place, a proliferation of small round cells produces a new connective tissue. This tissue causes inflammation and thickening of the peridental membrane, which is subject to necrosis, first, from its position between the two bony walls, causing pressure, and second, from deficient blood-supply.

Atheromatous patches, composed of granular dêbris, and granular débris and fatty detritus, in which are deposited lime-salts liberated from the tissue-cells and from the blood or lymph, are then formed. These patches soon become infected with pus-germs, or infection of the tissue in the primary stage of the inflammation may take place.

These pus-germs, according to Miller, are found in nearly every mouth, but more especially around the necks of the teeth. Infection means degeneration and liquefaction, not only of the immediate tissue, but also of the more healthy peridental membrane, but in a less marked degree.

Pus-infection producing pockets are formed first, by circumscribed inflammation at a particular point of the gum or peridental membrane at the neck of the tooth. The inflammatory process extends into the peridental membrane along a blood-vessel or lymph stream. This may extend part or the entire length of the root of the tooth, the tissue degeneration taking place in precisely the same manner as before, only in a circumscribed way. In phthisical patients, and those with low vitality, and patients who have been ill for any length of time, a low form of inflammation of the gums, extending to the peridental membrane, with pus infection, takes place and degeneration of tissue ensues, with or without granular patches and calcic deposits.

The granular débris or calcic deposits in all cases are a secondary consideration in this breaking down of tissue, the inflammatory exudate and pus formation being primary.

Sometimes the degeneration of tissue will extend the entire length of the root. The atheromatous patch of degeneration is always located in that part of tissue farthest from the blood-supply or at the point of least vitality, hence the reason of the breaking down of membrane and deposit upon the root of the tooth.

---

* "American System of Dentistry."

A pathological condition of the jaw, familiar to all dentists, which must here be described, although seemingly foreign to the subject, is due to the immediate cause of pyorrhea. Its etiology has never been explained. I refer to that condition of the jaw when the pulp is dead in the tooth and a large or small area of the bone about the root has absorbed away ; frequently the bone is entirely lost about the root, and the cavity covered over by the external mucous membrane. Upon opening this cavity the root or roots are exposed to a greater or less extent, depending entirely upon the size of the cavity.

When death of the pulp takes place, with or without alveolar abscess, inflammation of the peridental membrane may take place at the apex of the root or roots ; we now have the same process as before the pus infection and degeneration of tissue, the pus germs infecting the peridental membrane through the pulp-canal. Absorption and liquefaction of the alveolar process takes place after the death of the peridental membrane (not due to pressure of an alveolar abscess, but from pus and natural absorption, due to the destruction of the peridental membrane) ; the root is frequently, partly or wholly, covered with calcic deposits.

Lime-salts are chemically non-irritating, as cementum is properly formed from the peridental membrane ; and as exostoses are found on the roots of teeth without having caused any symptoms, calcic salts deposited here are physiologically inert, as any foreign material can be in the body. This is to be expected, since lime-salts in the blood is nature's great weapon with which to ward off and heal disease, and not to disorganize tissue.

That many forms of micro-organisms are present in the mouth, producing the original inflammation of the gums, there can be no doubt, since the cultures are there with favorable surroundings. They assist in producing the inflammatory process for the following reason : Treat a mouth with one, two, or three loose teeth, heal the tissues, and allow the loose teeth to remain. Stop the treatment except the free use of the brush, and in the course of a few weeks the inflammation can be seen starting from the loose teeth and extending from one tooth to another until all have become infected. Remove the tooth or teeth, and when the gums are in a healthy condition they will remain so by the same line of treatment. I have observed this many times.

The neurotics and degenerates, whether wealthy people or confined in state institutions, are mostly afflicted.

The age at which this disease begins favors those over forty years, but it is found in children. I have observed it in my little patients before having their teeth regulated. This is due, first, to trophic changes, and, second, to inflammation of the gums due to want of hygienic measures. I have also observed it in the mouths of asylum children, due to the same cause. Miller mentions "many rachitic children from four to six years who had but a few teeth left," and also "out of twenty-six cases under twelve years, in which seven manifested pronounced symptoms of pyorrhea,'' the class of food given asylum patients of all ages, together with a want of cleanliness, produces the inflammation of the gums, following with pyorrhea symptoms. A change in the management recently in a public institution near Chicago, and the appointment of an economical superintendent, caused the inmates to come down with scurvy, as the result of which a large number of cases of pyorrhea developed. Patients suffering with locomotor ataxia and paretic dementia are very prone to this disease. This is due to trophic changes. In forty-four locomotor ataxics, all had the disease in a more or less marked degree. Of three hundred and sixty-five paretic dements, fully two-thirds had pyorrhea.

A marked illustration of pyorrhea due to trophic changes and want of hygienic measures is found in the mouths of pregnant women, and a most marked illustration due to the same cause is in domestic animals or wild ones in captivity.

Some authors have tried to associate pyorrhea with catarrh and nasal lesions, such as polypi, adenoid vegetation and hypertrophy of the mucous membrane, or turbinates and stenosis of the nasal cavity, as well as tonsillitis and all forms of sore throat. In a general way these lesions are found among the degenerate classes, and while one is not dependent upon the other, they are frequently associated. Often patients suffering with pyorrhea claim to have been salivated. It can now be seen how such conditions can be brought about.

The period of life between forty and sixty years is to man a period of involution, when certain functions are ceasing to be active factors in the life of the individual. The structures devoted to retrograde metamorphosis assume predominance, and the arterial system shows a tendency to fatty changes. In both sexes at this period, as at puberty, there is a marked tendency to nervous diseases. The changes of what well may be called the climacteric are the results of deficient power of supply nutrition rather than excess in utilization. Hence the primary change of the arteries and their secondary consequence in the peridental membrane. The gums become inflamed, and there is no desire to keep the mouth in a hygienic condition; hence pyorrhea is more frequent in advancing years.

As the peridental membrane recedes, the teeth loosen. The irritation in mastication assists in maintaining the inflammation, and the destruction of the membrane is hastened until the tooth becomes a foreign body and is exfoliated.

The alveolar process, as has been shown, is a transitory structure, simply for the purpose of holding the teeth in place; when they are removed the process absorbs. It is reasonable to suppose that when the peridental membrane is destroyed, the process has lost its function and naturally absorbs away. This is hastened by the accumulation of pus in and about the process.

In a general way pyorrhea, like all diseases of the body, is influenced to mildness or severity according to the health and tonicity.

Treatment.

No one in the profession is more disappointed as to the views as to what shall constitute the line of treatment than the writer, since he has always advocated that pyorrhea was a constitutional disease and required similar treatment. Investigation has shown that inflamed gums are due to constitutional and local causes. It is another illustration of the fact, however, that to know the cause is to find a remedy. This does not necessarily follow that the cure is an easy one to accomplish, since the location of the disease is nearly always difficult to reach. Especially is this so in the later stages. The line of treatment in the early stages is clear. It must be purely of a prophylactic nature.

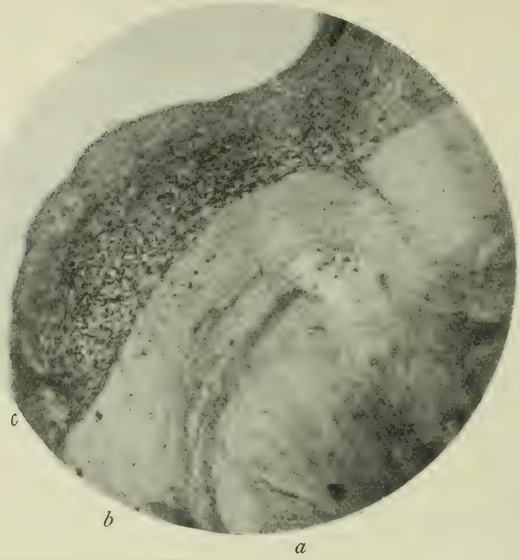
No matter what nature the patient may be,—a monkey, in the zoological gardens, a pet lap-dog, wild animals in captivity, rachitic and idiotic children in public institutions, or a degenerate in one of our best families, living in luxury without fresh air and out-door exercise, and upon food entirely at variance with what they require, must necessarily have soft, spongy gums. If the food be changed in animals, a vigorous use of the tooth-brush, together with antiseptic and astringent washes, with plenty of exercise by our patients, the gums will remain in a healthy condition, the peridental membrane will not become involved and pus-germs invade the tissue. In other words, healthy gums will invariably prevent the disease.

If inflammation has extended to the peridental membrane and pus infection has taken place, with or without calcic deposits, instruments should not be used so as to come in contact with the edge of the membrane. The membrane should not be injured under any circumstances. The slightest injury increases the area of the infection. Since inflammation and pus infection are the primary stages of the disease, and the calcic deposits always secondary, and a result, and since nature tolerates lime deposits in all parts of the body, it would seem immaterial whether the deposits are removed from the root or not, provided the application extends beyond the deposits, and reaches all parts of the diseased membrane. I know of no instance in medicine or surgery where the calcic deposits in any other part of the body are taken into consideration in the treatment of disease. Nature takes care of such deposits. Such being the case, there is no reason why nature will not tolerate calcic deposits on the root of a tooth. I do not at this time make the positive assertion that it is unnecessary to remove the deposits, since I have not had sufficient experience to warrant this statement, but simply offer it as a suggestion. From our past experience in the treatment of the disease, the deposits must be removed ; and right here I would suggest that in the future treatment of this disease a dissolving fluid that is not injurious to the surrounding tissue should take the place of instruments, especially when the disease is extensive.

What is necessary, whether we remove all of the deposit or not, is to use an antiseptic disinfectant and germicide in such quantities that all parts of the tissue, including the deposit from the gingival margin to the edge of the peridental membrane, shall become perfectly immune. If this can be carried beyond the calcic deposits so as to reach the edge of the membrane and restore it to a healthy condition, we have accomplished all that is necessary, since the cause of the deposit will be removed.

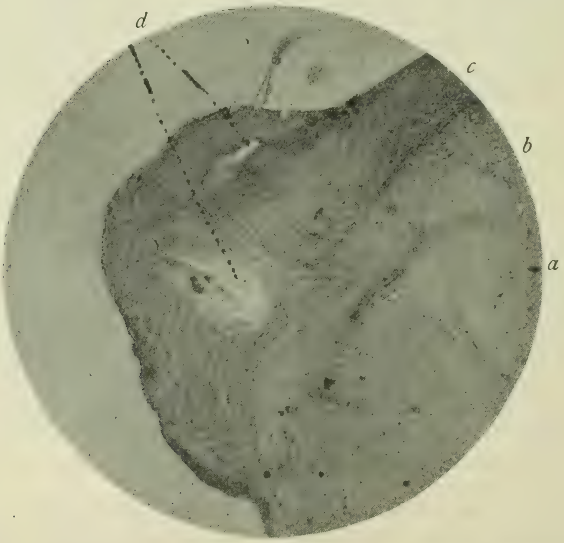
It is readily understood how, if the disease is allowed to progress, the farther the edge of the membrane is from the gum margin, the more difficult it is to get the drug to the edge of the membrane, hence the necessity of early treatment. The farther the disease extends, the less the blood-supply to the membrane, and the less show

FIG. 1.



a, Dentine ; *b*, Cementum ; *c*, Inflamed, thickened peridental membrane.

FIG. 2.



a, Dentine ; *b*, Cementum ; *c*, Peridental membrane inflamed ; *d*, Atheromatous degeneration.

for recuperation. I cannot recommend any particular antiseptic, disinfectant, or germicide, in the successful treatment of this disease. I have had marked success by saturating the gum thoroughly inside and out with officinal tincture iodin every other day.

The illustrations imperfectly show the changes which take place in the peridental membrane:

Fig. 1 shows the root of a cuspid; the dentine, cementum, and thickened peridental membrane filled with small cells of inflammation. Fig. 2, dentine, cementum, thickened peridental membrane, and atheromatous degeneration in two stages.

THE CONTOUR FILLING. A STUDY.

BY GEO. S. ALLAN, D.D.S., NEW YORK, N. Y.

(Read before the First District Dental Society of the State of New York, January 14, 1896.)

THE subject of contour fillings has been prominent before the profession for years, and the title of many an essay and article published in our journals. Much that has been written has been valuable and instructive, and as much of little use,—if not worthless. As a rule, the subject has been approached from one or two standpoints only; first, that of its intrinsic value as approaching the type set by nature. Over and over again it has been insisted on that it was of the first importance to reconstruct a broken-down tooth and return it to its original beauty and usefulness, and allow it to take its place in the dental arch and perform all its original functions. Somewhere an enthusiast has said the new tooth became "a thing of beauty and a joy forever." How much of this is true, many of us know to our sorrow. Again, the advocates of the principle have taken up their time in explaining the way of doing it, and with care and thought have gone into the details of how to manage the gold, prepare the tooth, and join the two together in a finished whole. With either or both of these two ways of handling the subject, little fault can be found, except in that they do not cover the whole ground. They do not go far enough into ground-work principles,—do not help our judgment enough when a decision is to be made in doubtful cases. So an effort will now be made to look a little farther and deeper into the subject, and seek other ways of bringing it before you. It is simply a truism to say, "Copy nature and restore the original shape." All accept the dictum at once. As to placing the gold in the cavity, that is a matter of skill and technique, and may well be passed by as not germane to our purpose; later on, though, your attention will be called to a few thoughts relating thereto.

Passing then the question of desirability as being self-evident and universally accepted as the ideal and correct one, and in a measure that of the how to perform the operation as having already and by many able men been carefully explained and described, we come to that of its advisability, and on what grounds good judgment is to be based. This seems to be the question of questions, and by all means the most important to consider. It is in truth a "condition, not a theory," which in most cases we have to consider, and the sooner all acknowledge this self-evident fact and act on it, the better it will be for us.

In order to properly present this point to you, it seems necessary to analyze the contour filling and separate the elements, so to speak, of which it is composed. At first sight, this would appear to be somewhat difficult, if not impossible; but for all essential purposes it is not so. A sufficiently clear and practical analysis can readily be obtained.

The first line of separation of parts may be made between the mind and the matter factors; that is to say, between skill, ability, and knowledge, and the materials, the substances which are to be united to form the perfected operation. The one is as essential as the other; they are mutually dependent, of course. In degree, the former is as variable a factor as the latter, and yet that such is the case is seldom acknowledged, nor is proper weight given to it in discussions on the subject. It is proper to say that the contour filling is a combination of skill on the one side, and filling-material and tooth-substance on the other. This is all well; but for certain reasons that will presently appear, another line of separation and naming of parts seemed desirable, and thus it was that a division into constants and variables was made, the gold or amalgam being the constants, and all the other elements the variables,—the gold and amalgam being for all practical purposes constant in their nature and properties, and on the other side skill and ability varying almost as greatly as the condition or conditions in which the tooth to be operated on is found. The elements of this analysis will at once be accepted as fairly representing actual facts, and their subservience to natural laws and physical conditions cannot be questioned. The personal equation represented by desirability nearly disappears, or rather takes its natural place as an element only. Thus it is, and only in this way, that the contour filling may be made a study, and our thinking and discussion of the subject have more of a scientific basis. The whole group of arguments heretofore employed, based on desirability, beauty, or esthetics, will at once be shorn of their power and value, and given a subordinate place. In truth, they are not the essentials to be considered in a careful study of the contour filling.

Having thus stated the plan of this article, and given a rough sketch of the analysis proposed, it will be necessary to go more carefully into details,—dissect and examine the elements we are to consider. It suits my train of thought best to give the precedence in my argument to a consideration of what I have termed the "constants" of the operation, viz: the filling-materials, the gold or amalgam to be employed, for they will be quickly disposed of. At this day the manufacture of gold, as well as that of amalgam, has been brought by the combined efforts of many manufacturers to a wonderful degree of perfection. The physical and chemical properties of both have been so completely mastered that it would seem that we are to expect but little, if any, improvement in the future. All the good and available properties of each are now placed at our disposal, and the bad ones practically eliminated. This is not only so, but in addition, the way to employ them, to make the best use of the one and avoid the other, are matters of common knowledge and enter into our daily practice. The contradictory qualities of the two kinds of gold, soft and hard, are beautifully adapted to the conditions required. They work almost like two different metals, instead of being (as they are) simply different properties given to a pure metal by the art and skill of the maker. Amalgam, also, now that its nature is better understood, is growing in favor constantly, and strange to say, good operators have ceased to abuse it and even recognize it as an indispensable aid in their tooth-saving labor; and still further, it has been found that gold and amalgam are good friends in one and the same cavity, and that the best qualities of both can be utilized in this way, the one even adding to the efficiency and value of the other,—the two combined producing results that neither one separately would be capable of. So uniform and valuable and so harmonious and helpful in companionship are our filling-materials that you will quickly, I think, agree with me that they can well be called constants.

We turn now to other elements, and seek in vain for similar properties or conditions. The skill of operators differs widely and absolutely. Character, conscientiousness, ability, and knowledge widely vary, and there is no way known by which one can put them in a common balance and weigh or compare them. They are the personal equation elements *de facto*, and in no two cases can they be said to be approximately similar.

With a little more care, we can now look to the third element of the contour filling,—the state in which the tooth to be operated on may be found. As a matter of course, it is in a more or less imperfect condition, the measure of which it is our purpose to look into. A sub-division is readily made; first, there is the mechanical weakening of the walls of the cavity by loss of tooth-substance; second, the chemical change that has taken place in what has been left of the tooth by the action of the acids of decay. These acids, as is well known, do not eat away the substance of the tooth layer by layer, but soak into the tooth-substance, and just in proportion to the depth of the penetration of the acids, is the structure of the tooth weakened and its nature changed. In all cases of ordinary decay there is a gradual shading off, as it were, or blending of sound tooth-substance with normal proportions of lime-salts and organic matter, and having the common hardness and elasticity of ivory with that of the completely decalcified portions in which the hardness and elasticity of healthy ivory is completely wanting. The area of acid penetration and consequent tooth-softening is often not only extensive, but no line of demarkation can be detected by touch or sight. Even in the sliced tooth under the microscope it can only be guessed at. But whatever the extent of the penetration of decay, let it be much or little, there not only do we find the softening of the dentine, but also the first cause of decay, the microbes that secrete the acid,—alive and active to continue the work of destruction by producing fresh acid. The chemical change that has taken place in the remainder of the decayed tooth may be even more important to consider than the actual loss of tooth-substance, for it is more difficult to realize or measure its extent.

Third, the anatomical element, or the approximation of the cavity to the soft, highly organized pulp-tissue, filling the interior of the tooth. How real this element is in the problem of tooth-salvation, it would be a waste of time to discuss. Not the least difficult part of the problem presented lies in the fact that there is no fixed way known, either of locating the exact position of the pulp or the degree of approximation of the decay to it. The relative proportions of tooth-substance and pulp-tissue not only vary greatly, but the relative positions and shapes are by no means definite or exact. When to this lack of knowledge to enable one to locate and define the danger point or points, we add certain constitutional traits and peculiarities which will derange all plans and precautions, the real nature of this anatomical element can be roughly measured.

Fourth. A variety of conditions or elements, such as the weakness or sickness of the patient, ability or unwillingness to stand pain or discomfort, lack of time or unwillingness to pay for same, all enter into the problem.

So far, nothing new has been offered you either as to facts or principles. Those principles that are most familiar to you have again been brought to your notice. In truth, it can be said there are no new facts or principles to be found.

The elements have simply been arranged in an orderly manner, grouped together on the line of possessing common qualities.

As alluded to before, the desire has been to present the subject in entirely an impersonal manner, to disconnect so far as his wish or belief was concerned the individual from it entirely. My ambition is to give the subject to you as a study or a problem, and the natural way to go to work was to make an analysis first.

In thinking it all over, the idea of an equation presented itself, and the more it was thought over, the better adapted to the purpose it appeared. If it could be put into shape, then the individual preference would necessarily disappear, or only appear as part of the equation.

The analysis just made, incomplete as it is, shows that the elements entering into the making of a contour filling and that influence directly the result are divided into two classes, First, those that are practically constant—viz, filling-materials, instruments, etc. ; and second, those that are variable, these latter being by far the most important, subject to great extremes in value, and, as a consequence, being most unreliable. These variables have certain other peculiarities that it is necessary to draw your attention to. They are indeed variables, but they are more than that, for a sub-division shows they represent opposing factors that enter into the study of the contour filling. The maximum of skill, knowledge, and conscientiousness are the weapons or tools by which to overcome the maximum of bad conditions, as found in the decayed, broken-down tooth to be operated on. They are as unlike as possible. They directly and positively influence the work in hand, just in proportion to their relative weight and influence. The result in all cases depends on their proportional force, power, and value. The one factor correctly represents power, the other resistance. The greater the resistance, the greater must be the power required to overcome that resistance. The power can be in a measure directly and absolutely controlled, but, like all human qualities, has certain well-defined limitations. By care, persistence, perseverance, one can greatly increase his skill and ability, even to the extent of making the difficult or impossible of to-day easy and quite possible to-morrow. There is no question, though, but that sooner or later the dead weight of resistance which bad conditions represent will arrest his progress and compel him to acknowledge defeat ; and sadly it may be, but with truth on his side, he will have to tell his patient it cannot be done. The line between the possible and the impossible is a constantly changing and fluctuating one. The wise man will always call a halt on the side of safety and prudence, and give his patient the benefit of every reasonable doubt and the full benefit of his experience. A good deal has been said of late on the importance of the adoption of the principle of conservatism in practice. Will any one doubt this truth, or question that in deciding whether contour or no contour shall be attempted, the principle of conservatism is both wise and important and should be duly considered?

This analysis and the remarks made thereon lead the way naturally to the main purpose of this paper. If one wants to supplement the study with a rule, he can adopt no better one than that the best and most acceptable operation is the one which combines the greatest amount of comfort with the greatest durability, and, incidentally, is accomplished with the least expenditure of time. Much present comfort attained at the expense of the early loss of a valuable tooth is not satisfactory. To prolong the life of a frail member of the dental arch is the first consideration.

The plan decided on was to construct an equation, one that would combine all the main elements of the problem. At first it seemed both odd and difficult to call in the aid of mathematics. Dentistry and mathematics apparently had no relationship or bond of union. They were dissimilar in all respects; but the thought gained in power the more it was considered. There was a definiteness and precision in a mathematical equation or formula that was very inviting. Results so attained cannot be questioned, granting only that the elements of the equation do not admit of dispute. An equation is even more powerful to convince the mind than the syllogism in logic.

With lapse of years my mathematics (never of the best quality) had become quite rusty. Patient consideration, however, of the problem satisfied me that the equation admitted of proper construction, and it was soon, with some help, put into proper form, and I now present it for your careful consideration.

Here it is:

$$\text{Result} = \text{Constants (filling-materials)} \times \frac{\text{Skill}}{\text{Bad Conditions.}}$$

Some of the objections that can and will be made to this equation can easily be anticipated. The constants, the filling-materials and instruments, are not strictly constant. This is granted, but so much the worse for the result, not the equation; for if we could not depend on our constants perfect contour filling would be unattainable. Practically, however, their variations, as has been already stated, are so slight as to be negligable. Again, some will magnify skill to that extent as to minimize the variables or bad conditions. So much the better then for the result; but the personal equation here is all powerful, and it is self-evident, as before stated, that all dentists are not equally skillful. Others will say the variables can be overcome. True, but to what extent, when they are at maximum or approach it? A stronger objector will say the equation is correct, but it is equally applicable to all fillings. Very true, but it does not affect the equation to extend its application. It certainly applies with the greater force to the more difficult and complicated operations, those where the difficulties to be overcome are greatest, and the means for doing so limited. It can be said as to the constants that, though not absolutely constants, they are nearly so, and can be absolutely and directly controlled, while the others, the variables, are to a limited extent only subject to change or management.

It is evident, in this brief survey, that the factors entering into the making of a contour filling are somewhat similar to those employed in building a bridge. The analogy is imperfect, but its very imperfections give emphasis and point to the illustration. The analogy between constants, strength and quality of materials entering into the construction of the two structures, differs only in degree. The skill and ability displayed by the dentist and engineer may be said to be equal and alike in both cases; they differ only as skill and ability differ in individuals in all other occupations in life; but the moment we compare the factors commonly known as foundations in the case of the bridge with its dental counterpart, the condition of the tooth in the other, we are brought face to face with the fundamental difficulties the dentist encounters in making his fillings. In the case of the engineer, granted that the bridge is of sufficient importance, time, money, and skill, in almost all cases, will enable him to make his foundations strong and secure. With the dentist, his foundations are made for him, and let them be good, bad, or indifferent, he must accept them as they come to his hands. The amount of change he can make in them is but little indeed. And not infrequently in securing his anchorage and hold he weakens his foundation, and in other ways endangers the success of his work. These points will now be briefly considered in closing.

First, in reference to the mechanical adaptation of the filling-material to tooth-structure, and

Second, to the chemical preparation of the cavity.

When the decay has greatly weakened the walls of the cavity, the point first to keep in mind is that the power of resistance of the walls is limited and doubtful; whereas the amount of pressure or force to produce thorough compression of the gold and adaptation, in case gold is employed, remains the same. It is all-important, therefore, to be cautious and have good judgment. Here it is that the properties of the so-called soft gold come into play. The force that will thoroughly pack a pellet of soft gold of a given size and weight, is wholly inadequate to perform the same duty with a similar pellet of hard gold; therefore it is wise in almost all cases to select the soft gold for the bulk of the filling, where the danger from imperfect adaptation is greatest. As the soft gold packs easier, so also does it spread away from the point of the instrument, and the compression becomes difficult, owing to the gold leaving the cavity on the unprotected side. To obviate this difficulty the matrix has been called into service, and most beautifully does it meet the want. I cannot too strongly call your attention to its value. It is with the Jack matrix that I am most familiar, and it is capable of a wide range of usefulness. A large class of cases though, and those where its want is most felt, seem to be beyond its reach. It requires, of course, the presence of a neighboring tooth to wedge against, and this is not always present, or if present, may be in a bad condition. But when it is not present, the necessity of a contour filling is not great.

A greater trouble arises when the shape of the crown has been changed by decay to the extent that when the matrix is applied it does not stand away from the tooth sufficiently at the grinding-surface to allow of restoring the shape. Just here it is that extra skill is required in placing the wedges that hold it in place ; but oxyphosphate properly prepared can quickly be made to fill the gap, not always, but very frequently, and even red gutta-percha will answer. If the oxyphosphate, when it is mixed, has a little carmine added to color it, one can be very certain that none will remain in the cavity to work harm in the end. By making the mixture very hard and stiff in the beginning, it sets so quickly that but little, if any, time is lost. The wedges can then be forced into place, and the matrix will stand away from the tooth as required, so as to restore the shape. Gold and tin pellets even answer a good purpose, and take even less force to properly compress. The very worst thing that can be done is to rely on hard or cohesive gold only. Of late years amalgam has come into play, and experience proves that it has many and exceptionally good qualities. Gold and amalgam make a good combination, and amalgam will strengthen weak walls in a way that nothing else will, and in addition it can be lapped over the point of danger of pulp nearness and thoroughly protect it. None of the good qualities of either material are lost in this bond of union, rather they appear mutually to assist each other.

Let me close with a word on the chemical preparation of a cavity. Knowing as we do now the true cause of dental caries, it is not difficult to answer the question, "What is to be done?" but the other question which instantly comes to the front, "How are we to do it?" is quite another affair. As tooth caries is a sequence of germ life, the plain answer to the first question is : Remove the cause and so prepare the tooth that it cannot again become active. Bring the tooth to an aseptic condition and maintain it so. Accomplish this much, and dental caries is at once arrested, not again to appear. Is this possible ? Maybe I hazard too much when I say that my conviction is that it is one of the probabilities of the near future. It will help us much, in considering the problem, to remember what has already been done. It is not an uncommon matter to find cases where, from natural causes, caries has been completely arrested, and the wise man in such cases leaves well enough alone. Oftentimes these cases seem to be very local in their nature, one or more teeth in a mouth being so fortunate, while their neighbors are slowly but surely disintegrating. Why is this ? Has any one ever attempted to solve the riddle? And yet it most certainly is capable of solution. When it is solved, suffering humanity will bless the man who brings them the relief. Science has done something, as those who have experimented with salts of silver and copper can attest. Copper amalgam has now and then helped me greatly, and so has nitrate of silver. The copper amalgam I have only allowed to remain long enough in a cavity to gain its toxic effect. Some of the salts of copper I have experimented with too recently to say anything about as to permanent results, and yet they seem to promise well.

As suggestions only are these thoughts given you. You must take them for their apparent worth.

GUAIACOCAIN CATAPHORESIS, AND LOCAL ANESTHESIA. OUTFIT AND TECHNIQUE.

BY WILLIAM JAMES MORTON, M.D., NEW YORK, N. Y.

So many inquiries have been addressed to me asking for information as to methods of procedure, that I gladly take the opportunity to answer them collectively through these columns.

Source of Current.—The "*continuous*" or "*constant*" electric current, whether obtained from the street mains or from any reliable battery, is the current required in cataphoric procedures. Alternating and pulsating currents are not practically available.

The "Edison current," 110 volts, as in common use, requires a controlling device. The best is the "Wheeler Fractional Volt Selector." For controlling street main currents of a higher voltage than 110, special devices must be obtained.

As to a battery, a portable "red acid cell" of twenty cells, or any form of Leclanché cell, say thirty cells, or any other good battery, will answer every purpose.

Electrodes.—These, devised and invented by the writer, are an "indifferent" or "dispersing" electrode and "active" electrodes. The small dispersing electrode is a circular disk of carbon, three inches in diameter, covered with two layers of sheet punk or amadou, bound at the edges by an insulated wire pressing into a groove.

This is large enough for use in cases of anesthetization of the gums or of sensitive dentine. For large areas of skin a larger dispersing pad electrode, say 6 x 6 inches, should be procured.

The active electrodes vary in shape according to the purpose to which they are put, but retain the special device of perforations to hold solution, etc. For the skin flat single plates of carbon or block tin of circular shape suffice. (See illustration, DENTAL COSMOS, Jan., 1896, p. 52.) For the mouth in general a flat electrode resembling a mouth-mirror is convenient.

For the gums, for use in extraction, implantation, etc., the electrode is made tong-shaped and unlike any electrode of this shape formerly constructed; *both* plates are of the *same* polarity.

The carbon, or block tin, in the active electrodes is one-fourth of an inch thick, is perforated freely to about two-thirds of its depth by drill holes one millimeter in diameter, or is perforated completely, and a shallow reservoir provided behind it to hold an excess of solution. The body of the electrode is of ebonite, raised two to three millimeters at the edges of the plates to form a cup into which is inserted a piece of soft and porous blotting-paper cut to fit exactly, or a soft piece of felt or other absorbent material.

For sensitive dentine the active electrode is a small stiff piece of platinum wire, tubular at its end, and perforated from the sides into the tube in order that it may hold an excess of the solution. Around the end of this "applicator" is wrapped a pledget of absorbent cotton.

This constitutes in the main all the electrodes necessary; modifications for special cases will suggest themselves.*

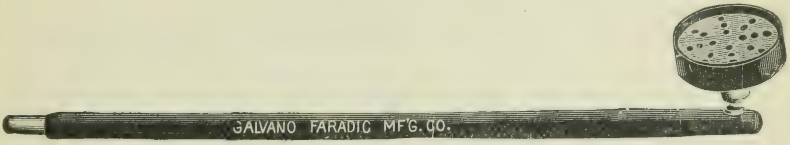
---

*For the illustrations we are indebted to the Galvano-Faradic Manufacturing Co., 300 Fourth avenue, New York City.—ED. DENTAL COSMOS.

Rheostat or Current Controller.—If the current from the street mains is to be used, preference has already been expressed for the "Wheeler Fractional Volt Selector." This same apparatus is equally available with a battery current. Its chief utility is in relation to sensitive dentine, where it is of highest importance that the initial voltage employed and current strength attained shall not cause pain. But in relation to the skin and mucous membrane any ordinary rheostat will answer the purpose.

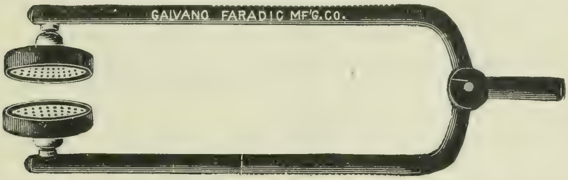
Again, it is quite possible to one at all familiar with his "galvanic battery" to use the ordinary cell selector to bring into circuit a limited number of cells (thus working with a low voltage), and to regulate the flow of current from this small number of cells by aid of common water rheostats, provided that ample sponge tips break the strength of the first water contact.

Fig. 1.



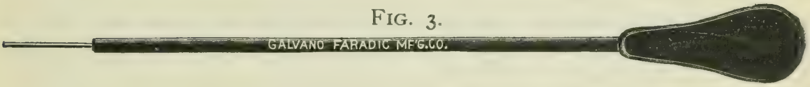
Morton's Mouth Cataphoric Electrode. (1 inch diameter.)

Fig. 2.



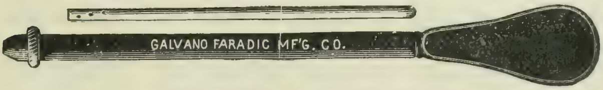
Morton's Tong-shaped Duplex Cataphoric Electrode.

Fig. 3.



Morton's Tubular Cataphoric Applicator.

Fig. 4.



Needle-Holder and Needle.

An instrument like the fractional volt selector, however, saves trouble and annoyance.

Milliamperemeter.—Not only is it necessary to regulate the voltage employed, but also it is equally essential to have an instrument to record the rate of flow of the current attained. This of course varies according to the voltage, or, what is more important, according to the resistance, which in this case is tissue. This rate of flow termed "current strength" is measured in amperes, and in medical and dental work in thousandths of an ampere, namely milliamperes.

A very small fraction of a milliampere causes pain in sensitive dentine. No reasonable idea of "dosage," nor means of comparison with other cases can be had without the record of a milliamperemeter. It is a constant guide to the administrator.

Any good milliamperemeter will suffice, but its scale should be large and easily read. An instrument recording from one up to ten milliamperes is preferable.

Solutions and Fluids.—Aqueous solutions of from four to thirty per cent. of hydrochlorate of cocain may be used. The writer, by combining guaiacol and anhydrous hydrochlorate of cocain, has found what seems to be a new compound rather than a solution. To secure uniformity of action (for some guaiacols are far more irritating than others), the solution or compound is termed *guaiacocain.* It is a ten per cent. mixture of hydrochlorate of cocain in pure guaiacol; this percentage may, if desired, be increased to thirty per cent. This solution, as above given, answers every purpose perfectly for anesthetization of dentine and of the skin, but for use upon mucous membrane it should be diluted to at least one-half, or otherwise slight and superficial destruction of tissue may ensue. I use for dilution a ten per cent. solution of cocain in glycerol, mixing it with guaiacocain in equal parts. Guaiacocain may be procured of McKesson & Robbins, New York, or at dental depots.

Technique.—Skin. Using aqueous solutions of cocain, the skin must first be thoroughly washed with soap and water. When guaiacol is employed, this is unessential.

Mucous membranes.—No preliminary preparation of the mucous membrane is required.

As to the active electrodes, the solution is *first* dropped into the perforations until they are full; the absorbent material is then fitted to the shallow ebonite cup or wrapped about the applicator, and a liberal supply of the solution dropped upon it. It is now ready for use.

The flat electrode is applied directly over the spot to be anesthetized and pressed with some firmness against it, as, for instance, over a cancrum oris of a buccal surface.

In the case of the tongs electrode, some care is requisite to secure a proper adjustment and to secure uniform action. It is well, after the electrode is in place, to pack in absorbent cotton, not too wet with solution, to fill up inequalities of contact, or to bridge over (in certain cases) the gap between the blades.

For dentine, the cavity is first filled (a rubber-dam should be used) with a pledget of absorbent cotton dipped in the guaiacocain solution (avoiding a surplusage and yet not too dry); the applicator itself should then be dipped in the solution until it holds all it can, and a small layer of cotton be twisted about its end. During treatment, the current may be turned off, possibly twice, and the pledget in the cavity be freshly dipped in the solution, or, as I prefer, by the use of my own applicator, this pledget may remain *in situ* and the fresh supply be furnished by removing and dipping the applicator itself into the solution; or, better still, a few drops of fresh solution may be from time to time dropped onto the tip of the applicator by aid of a pipette, thus avoiding entirely what is certainly objectionable, and that is any interruption of the flow of the current.

The dispersing electrode may be held in the hand, may be held by the operator upon the cheek or beneath the lower jaw, or placed upon the chest or back, or, in short, anywhere at a reasonable distance from the active electrode. The latter, the active electrode, is to constitute a positive pole, and the former a negative pole. To determine the polarity, apply a few drops of a saturated solution of iodid of potassium to a piece of paper and test the two terminals of the cords ; free iodin will appear at the positive terminal and cause an iodin stain. Or test in the same manner by aid of a piece of litmus-paper wet with water ; the positive terminal will turn the paper red, the negative will turn it blue.

Everything now being ready, the connections tested and polarity having been carefully determined beforehand, the current may be "turned on" most gently and gradually.

In the case of sensitive dentine, skill, carefulness, and experience are essential. The first onset of the current may at the best cause a slight burning pain. To avoid this contingency, it is well to give the solution five minutes' time to effect a superficial anesthesia prior to applying current. The applicator is adjusted, and the current, which cannot be too gradually applied, is then brought into circuit. The patient will feel a slight burning sensation, which in a moment will subside, when more current may be added. Each accretion of current during the first five minutes will cause the same sensation. Thus the treatment is followed up, step by step, consulting the patient as to the slight pain, until, in about five to seven minutes' time, it will be found that the current strength may be largely increased without causing any sensation whatever. At this time I carry the current up to from two to two and one-half milliamperes, and, after two to three minutes at this current strength, consider the dentine sufficiently benumbed to endure operative procedures without pain. A point of prime importance is to avoid movements or removal of the applicator during the current flow ; for, as is well known, a "steady" current produces no reaction of motion or sensation, while a "varying" current produces these reactions most unpleasantly to the patient.

With these hints in mind and with a little experience, not only dentine, but the contents of the pulp-cavity, and even the tissues outside of the tooth, may be effectually anesthetized via the pulp-chamber. And it may be mentioned in passing that not only may anesthetizing substances be thus employed, but also any other remedy—germicidal, antiseptic, escharotic, etc.—which it is desired to apply to the tissues above named.

◆

PROCEEDINGS OF SOCIETIES.

NEW YORK ODONTOLOGICAL SOCIETY.

A REGULAR meeting of the New York Odontological Society was held on Tuesday evening, January 21, 1896, at the New York Academy of Medicine ; the president, Dr. WILLIAM CARR, in the chair.

Incidents of Office Practice.

Dr. V. H. Jackson. I have several specimens here of a new metal alloy, which is known as Columbian silver. It seems to be non-oxidizable, and works very much like German silver. It probably is a similar combination. It cannot be molded easily, but can be stamped into any desired form. It has been utilized about three months for stiffening rubber plates. It has been used for making probes, and it is proposed to put it in form for the use of broaches for handling acids, and other dental instruments. I have some specimens here that I tested by immersing in different acids. Here is one that was put into nitric acid, which dissolved it very rapidly; but you may leave it in muriatic acid, and it will not be affected. You will find here a piece of Columbian silver and also German silver, each having been left in the solution for some hours, which were not tarnished. In the next specimen, they were placed in a solution of sulfur, and are not much tarnished. The next is in muriatic acid, and the fourth in nitric acid, and you see the results. It is now used for the manufacture of solid knives, forks, spoons, etc. The ordinary table knife has been shaped into spatulas that can be utilized for handling plaster, and into ordinary instruments that are used by the dentist. There is also a modification of this Columbian metal, that is called Montana gold. I am not very familiar with it. It is made by the addition of copper, and it takes a very beautiful gold-like finish, and is very cheap. It is now being used for the manufacture of watch-cases and jewelry.

Dr. Northrop. How does that metal stand in the mouth?

Dr. Jackson. I have not used it long enough to make a full report, but it tarnishes a little, similar to the German-silver springs.

Dr. Northrop. Which do you find the better?

Dr. Jackson. The Columbian silver. It fuses at 2600, and pure gold or the ordinary gold solders can be used with it. You can flow any kind of solder over it. It is now being tested for piano-strings. The manufacturers propose to furnish three grades,—hard, medium, and soft. The hard, of course, is made by drawing it through a draw-plate, hammering, etc. Ingots can be gotten for from sixty to seventy-five cents per pound; wire and plate can be procured for about one dollar per pound. It is now used for the backs of mouth-mirrors, nerve-explorers, acid pans, etc. It is dissolved in nitric acid about the same as is zinc. They are experimenting with it with the idea of making points for hypodermic syringes, and I think there is no reason why it should not be used for dental purposes. Soft solder flows very nicely on it, and also gold, more readily than on German silver.

Dr. Northrop. What do you think of the wire?

Dr. Jackson. The spring seems to be equal to the German silver.

Dr. Perry. Do you feel impressed with the value of this for regulating purposes?

Dr. Jackson. Yes, that is why I am so impressed with the value of it. I have not known of this material being sold at the dental depots, but I believe they are going to put it on the market. It oxidizes when you anneal it, something like German silver, but it can be polished afterward. It can be procured from J. L. Hitchcock, 753 Sixth avenue, New York City. He will call on you if you send him a request to do so.

Subject passed.

The PRESIDENT. I have the pleasure of introducing to you Professor Black, of Jacksonville, Illinois, who will read the paper of the evening.

Dr. G. V. BLACK. Mr. President and Gentlemen: I am very glad to be able to meet with this society in the great city of New York, to speak with you and look into your faces, and learn to know you better. It is a number of years since I have spoken to the profession in New York, although I have been here frequently on other missions. The subject on which I shall speak is nearly new in dentistry, although in some other professions it has become an old and every-day subject,—that is, the physical properties of things we use and work upon. It relates, of course, to the mechanical affairs of dentistry in one sense, and yet has a very direct relation with pathological conditions. When I was asked to speak to this society, it was my idea to speak only of gold; but when I came to write a paper, it seemed impracticable to do this. We cannot consider the physical properties of gold as a filling-material aside from a consideration of the teeth. Hence it was necessary for me to refer to some work I have done upon the teeth as well. We must lay amalgam aside for this evening. I had hoped to be able to say something in regard to it, or to say something in regard to the plans developed for measurement of shrinkage and expansion and the changes of bulk at this meeting; but we have quite enough for the evening without it, and certainly I do not wish to be so long that you will not have opportunity for discussion, for I want to hear you speak on the subject.

The title of my paper is "The Practical Utility of Accurate Studies of the Physical Properties of the Teeth and of Filling-Materials." I received from members of this association twenty-four experimental gold fillings. I left home ten days ago. One box of fillings reached me in Chicago, and I could not test those; but the ones that I received in time to make studies of were twenty-four in number. You will understand that these fillings are made in steel matrices, and from the appearance of the fillings I suppose something must have happened to the matrices, because the fillings were irregular in size, a thing that did not occur before. The fillings heretofore were so absolutely regular in size that I could depend upon them. The irregularity was not very great, when we came to count it in thousandths of an inch, but it was too great to allow me to use the measurement method in determining the specific gravity, so it was determined by the regular method of weighing in air and water. I will read the list of experiments, and I thought it well to give the name of each operator.*

Discussion.

Dr. S. G. PERRY. There is a great deal of inspiration in the paper. The practical application of it in our profession is immense, because it has the authority that goes with exact scientific statements, something that has been lacking in great measure in our profession in times past. It has been common to hear of men who have filled teeth with a great show of accuracy, which would not stand examination at all. As I said before, this paper comes before us with a stamp of authority. I am not able to discuss it from a scientific standpoint, but from a clinical standpoint it coincides with every-day experience exactly. There is no statement in it that will not be substantiated, I am sure. Every level-headed practitioner must feel instinctively, even if he cannot yet reason it out, the absolute worth of it, and the possibilities of its practical application in his daily practice. There is an immense amount of good to come from its application, and it is opening up a new era to us. Therefore I congratulate our friend from the prairies, who comes to us with all the freshness and newness of the morning in his work.

---

* Dr. Black's paper is printed in full at page 296 of the current number.

Dr. EDWARD C. KIRK. This is another section of a report of a very valuable series of investigations that Dr. Black has been making for us. I feel that the paper cannot be discussed in the ordinary sense, but I think I detect running through it the expression of a feeling as though the author had been placed upon the defensive in a certain way with respect to his work, and it is possible that he has been placed in this position because of the criticism of certain men, or classes of practitioners, who fail to see the immense ultimate practical importance of the work Dr. Black is doing in this exact scientific way. They fail to trace the relationship between the results which he is getting by exact methods and instruments of precision, and the every-day work that they have to do in the mouths of their patients. It is perhaps not clear to all of us why a series of test fillings put into steel matrices should have so remarkable a variation in their resistance to stress, when there is apparently so small a variation in the specific gravity. That was a point that occurred to me while the author was reading those results; the variation in resistance to stress, as I understood it, was much greater than the variation in specific gravity. There seemed to be a lack of correspondence there. As I understand the essayist, all of these tests were made on the fillings after they had been removed from the matrix. If you will recollect, in some of the fillings reported the specific gravity was high, and yet when they were subjected to the test of stress they failed to show as high a figure in pounds as some of the cohesive fillings which had less specific gravity. At least that was my inference. Am I right on that point, Dr. Black?

Dr. BLACK. That has occurred twice, I believe, in this series of fillings. It is something that I never saw before, in making cohesive and non-cohesive fillings. They have invariably given me the lighter filling of non-cohesive gold. I think Carl Röse is right when he says it is impossible to arrive at the same density with non-cohesive as with cohesive, for the reason that the non-cohesive is non-cohesive by reason of being covered with what he calls the "luft-haut," or the skin of condensed air, so it is impracticable to get it together; but a number of the fillings reported as being of soft gold are thoroughly cohesive

Dr. KIRK. We find certain cohesive gold fillings which had a fairly high specific gravity, and still had a low resistance to stress. In that case, it would indicate very strongly that there was something in the arrangement of the particles of the filling which weakened the mass of gold so it would not support the high degree of stress. It is possible that the over-malleting of the gold may break it up into a powdery or sandy condition, and that when subjected to stress, without the supporting walls of the matrix, it would go to pieces. We may get from this a hint of value to us in our practical work of inserting gold fillings.

If the laminæ are placed horizontally with the open mouth of the matrix, and the filling completed in that way, the stress supported by a filling when applied in a direction perpendicular to the plane of the laminæ of the gold would be higher than when the stress was placed on the ends of the laminæ, just as you would if you placed a pack of cards together and applied stress upon their sides you would get a high resistance ; but if you placed your cards on end, you would have a breaking down. It seems to me that the feature of the molecular arrangement of the filling is a factor indicated in that list of tests, and should be taken into account.

With regard to the series of experiments which Dr. Black has been making with reference to the physical properties of tooth-structure, it seems to me that the same idea of molecular arrangement, the arrangement of the structure of the dentine, may also be a factor in the question of resistance to caries, quite apart from the question of density, or the percentage of lime-salts. I think we should heed the warning which Dr. Black has given us, to judge of his results strictly within the lines he has laid down, and not charge him with all sorts of erratic ideas which he has carefully excluded from his work.

Dr. C. J. Essig, Philadelphia. I do not feel that I can throw any additional light on the subject. I was very much struck with the thoroughness with which Dr. Black has performed this work, and I was much pleased at his method of getting at the minute details of the operation of filling teeth with gold. I feel sure the paper will have a most excellent effect on the dental profession everywhere, for it fixes a standard for their work. It directs their attention to the possible oversights of every-day work in the office, and it probably will direct their attention to seeking for the cause of some of their failures. There are many valuable points in the paper, and I would be glad to have an opportunity to read it carefully. After that, I should feel more able to discuss it intelligently. There is so much in it that requires deliberate and careful thought, that I hardly feel like getting up on the spur of the moment and attempting to say anything about it.

While the essayist was reading the paper, I could not help thinking of the great difference in results that is obtained by different men with the same material ; and then the next thought was, how teeth can be preserved with the same agent in so many different ways. And then it occurred to me that there are many causes, most of which Dr. Black called our attention to, that have much to do with the durability of gold fillings. We had in Philadelphia, until a few years ago, a dentist who practiced until he was eighty years of age. When I commenced to practice, I occasionally saw patients, generally old persons, who had gold fillings in their mouths done by him. I used to think that all his fillings were defective, and that it was my duty to remove them. They seemed to have very imperfect adaptation, and were not flush, and yet I always found that the dentine beneath them was absolutely perfect. I cannot say I ever knew one of those teeth to show decay under the filling. At that time I had a conversation with a professional friend about these fillings. I said I always felt called upon to remove them, and he said he did also, but that Dr. Gardette had a peculiar way of putting the gold into the cavity; he used only non-cohesive gold, and seemed to line the cavity first, and that he was not careful about density afterward, but that they rarely failed. This only shows us that good results can be obtained by different methods. The manner in which gold is introduced into teeth varies greatly. Theoretically, we might say the only way to get a good gold filling is to use either the electrical or mechanical mallet, and start the gold from definite points, and by using very thin layers of cohesive gold, and welding the gold very carefully, and not leaving one piece until all the rest was thoroughly welded. I think that is the highest grade of filling. I got the impression to-night also, from Dr. Black's experiments, that the greatest density was gotten in that way.

With regard to the durability of fillings, here we have the work of Dr. Gardette. I have been told by intelligent people, in whose mouths I observed this work, that it had been standing for fifty years. On the other hand, the best work from the use of the electrical mallet is the slow, gradual building of cohesive foil in solidity, and the restoration of contour is unquestionably far ahead of any other method.

Another thought comes to my mind, and that is, that it is to be regretted that we have not a material for filling teeth that would take less time and force in its thorough adaptation than does gold. At the present day, in the filling of the larger cavities, we cannot help recognizing the fact that the only way to get absolute density and close adaptation—because from Dr. Black's experiments even the best fillings have some percentage of air-space—requires an immense expenditure of time and nervous strain, in the use of cohesive gold, slowly building up with the electrical or mechanical mallet. This falls with destructive force sometimes on the peridental membrane. It is an enormous strain to the patient, and is a greater one to the operator, and is also so expensive to the patient as to put such operations beyond the reach of the majority.

Dr. KIRK. I may have made a mistake in quoting Dr. Black as deducing from his researches that the resistance of teeth to the invasion of caries was not affected for good or ill by the difference in density of the tooth-structure. In other words, that a tooth which was of a low degree of density and low percentage of lime-salts offers just as great resistance to the invasion of caries as a tooth of high density and maximum of lime-salts.

Dr. BLACK. They seem not to be related at all.

Dr. KIRK. In other words, a dense tooth will decay just as rapidly as a soft tooth?

Dr. BLACK. It is just as liable to decay.

Dr. KIRK. Is it liable to as much decay?

Dr. BLACK. I should say a piece of chalk would be dissolved more rapidly than a piece of hard limestone, but at the same time there is not a sufficient difference between the different teeth.

Dr. KIRK. The difference in percentage is not great, but the deduction is that even the amount of variation which has been shown by Dr. Black to exist does not affect their relation to caries at all. That seems to me most remarkable, and I do not understand how Dr. Black reaches that conclusion.

Dr. H. W. Northrop. How does the doctor account for the destruction of those teeth that the majority of us as operators agree as to the quality of structure when we find that fillings are rapidly undermined and we classify them as *soft* teeth?

Dr. W. Jarvie, Brooklyn. I feel as most of the speakers, that the paper is of such a character that it is almost impossible to discuss it. It is largely a statement of the results of experiments. We know Dr. Black's experiments have been thoroughly made, and we must accept them for the present, but some of his deductions in regard to the value of the density of the fillings I can hardly accept. I believe with him that adaptability is the quality most requisite in a filling. The second most requisite quality I should say is finish, and then density and strength. In what we term simple cavities, that is, cavities having walls all around, I do not think density is of very great value. As Dr. Essig has remarked, I have seen time and time again fillings made with non-cohesive foil, that were pitted on the surface, exceedingly imperfect and soft; you could almost put an instrument through them, and yet, if you remove them, you find the dentine clean and not at all decayed. Such fillings had no density, and yet they had adaptability. There is a large class of fillings that we are called upon to insert, on the approximating surfaces of the incisors and on the labial and buccal surfaces of teeth, upon which no strain whatever comes. In fillings of that kind I believe density to be of small consideration, provided perfect adaptability has been obtained and the surface is sufficiently dense to allow of a good finish. I think that is all that is necessary. Where a strain comes upon a masticating surface we must have density, and density in such fillings is as necessary as adaptability. Without density in such cases you will not have a filling that will preserve the tooth. I believe thoroughly with Dr. Black that in a filling of soft foil upon which force of mastication is to come, better not have any cohesive gold on the surface, for the reason he has given in the paper. Better have it all of soft foil or none.

Dr. C. G. Pease. I would like to ask Dr. Black whether the lateral pressure of the gold filling on the walls of the cavity acts in any way by such constant pressure upon the organic substance of the tooth, and through that upon the inorganic? I ask for information, as that thought has been in my mind, and I have not made any experiments.

Dr. Black. I do not think you will bring any pressure upon a tooth in this way that will influence very much the play of vital forces in the tooth. You might do it through enamel as well as through gold. Of course, the presence of a foreign body may be something, but the principal difficulty is thermal changes. You have injury to the tooth through thermal changes, but not simply through the presence of gold other than that. I think that is the great enemy in metallic fillings, of course. The teeth seem to tolerate gold very well. I have had long and laborious work in hunting out and grinding into cavities that have been filled for a long time with gold, for microscopic examinations, and find the tubules run right up to the filling and are open just as when the fillings were put in the tooth, the fibrils being alive all this time. Often we find that the fibril has been alive very close to the gold.

Dr. PERRY. I confess I was a little disappointed that Dr. Black did not give more attention to the question of adaptability to the walls. The fillings I put in were of two distinct characters, one of absolutely soft gold and applied in the old-fashioned way, being pressed with a wedge against the walls and then the hole made by the instrument filled with a smaller wedge, then a smaller wedge, and so on. The cohesive fillings were put in with narrow strips as described, and no difference, as far as the instruments were concerned, except that the cavity being a very open one, I employed my straight pluggers, so there should be no spring. The layers of gold were very thin, and it was done patiently with a view of getting the best result possible. It was packed very carefully against the walls all around, but with not much mallet force, as I mentioned in the little statement I made in regard to the filling. I expected to find, when I examined the fillings, that there would be a finer adaptation with the strictly soft gold packed with the wedge than I should find with the cohesive gold packed with the mallet. It seemed, however, that the adaptation was even better with the cohesive gold, as far as I could judge, with the best magnifying-glass.

Dr. J. F. P. HODSON. Was it not the fault of the gold?

Dr. PERRY. I thought it was a wonderfully good adaptation, considering that it was strictly cohesive gold and packed as such from beginning to end. I expected that the soft gold which was wedged against the walls all around would give the best adaptability, but it really did not. Have you any recollection, Dr. Black, as to the general average of the surface left by the cohesive gold fillings that were sent you, as compared with the soft ones?

Dr. BLACK. The adaptation of the cohesive fillings was as good as fillings said to be of soft or non-cohesive gold.

Dr. R. C. BREWSTER. Is there any difference in the power of resistance in a poorly calcified tooth and a densely calcified tooth, as against the conditions that cause decay?

Dr. BLACK. Accurate tests show that such a thing as difference in caries between poorly calcified teeth and densely calcified teeth does not exist.

Dr. JARVIE. It seems to me this subject ought to be carried a little farther by Dr. Black. He has told us what appear to be wonderful things regarding the strength and resistance of dentine. He tells us that the resistance of dentine under pressure is greater than that of gold. I do not know how that impressed the other gentlemen, but it surprised me very much. He tells us that the calcification of almost all teeth is exactly alike. What I would like him to tell us is, why, if the above is true, some teeth decay more rapidly than others, and how does he classify that kind that decay and redecay in spite of our best efforts?

Dr. HODSON. We have become so accustomed, in the course of the years, to assuming all so-called softness of the teeth to be caused by mere mechanical deficiency of lime-salts through their chemical solution by external agents, as to have missed apprehension of—to my mind—specially important factors lying behind it. I believe the condition to be not chemical solution merely, but a vital degeneration, of which the solution of the lime is but the last and final one of the factors,—an effect, not a cause,—the last step in the stairway of degeneration. The lime-salts, as such, are no more deficient in quality, on the one hand, than is the animal substance on the other; and neither half so much as is the *life principle*, so resistive to all decay and death. This presumes bad marriage between the animal and mineral constituents, utterly bad assimilation and absence of *toughness*, not hardness, which makes the ideal decay and germ resister. Does it seem wise to add to the already heavy burden of such tooth-material heavy, conducting metallic stoppings? My own practice is diametrically opposed to such procedure. I should feel that *any* stopping in such teeth would surely require renewal, and that I should gain largely with "emollient" stoppings, which, besides being so, would be in their changings constantly following up, while they would minimize, extension of decay and edge-softenings, meantime hoping for and treating for changes in the general system which might arrest the degenerating process and give some real basis for hope that, then applied, permanent stoppings would be of some permanent value.

Dr. E. PARMLY BROWN. It is hard to find any fault at all with Dr. Black's paper. The softest teeth I ever saw I have found to be best preserved with gold, with the exception of molars. Is there a man who dares to say that he can put gutta-percha in soft incisors, cuspids, and bicuspids, and protect the teeth? Or is there a man that can put an oxyphosphate filling in such teeth and preserve the margins? Can even the best amalgam be put in a tooth without some change taking place? No man lives that can lap over a delicate margin of a white soft tooth and protect it with anything but gold. I make that statement without hesitation, and I challenge any one to disprove it. Notwithstanding that, I am using gold alloy almost entirely for the posterior teeth. A few years ago we were killing ourselves. Many died by the strain of putting gold fillings into cavities in the back of the mouth, and only a few did it successfully in this or any other country. It is time we packed gold solidly. Dr. Black's paper is a splendid one. Gold needs to be packed solidly, but with different degrees of solidity. It stands to reason that a contour filling needs to be condensed with greater care and made harder for leverage strain than even a filling on the grinding-surface of the molars, and no man should put one particle more of gold in a tooth than he would put in if he came before this society at a clinic and took a perfectly good tooth and entered it for anchorage to make a specified filling. If you cut away more tooth-substance than necessary for anchorage on account of decay, fill it up with oxyphosphate or something else. Condensation is a very important factor, but there are a dozen others just as important. You want good eyesight and honesty as well as condensation of gold. You want mechanical skill and anchorage and form, and you want to know something about what makes decay and what will prevent it.

Dr. BLACK. I see how difficult it is for you to understand what I mean when I say the density of the teeth bears no relation whatever to caries of the teeth, and it is my effort to emphasize and make you understand that proposition that has caused Dr. Kirk to think my paper appears to be upon the defensive. I never thought of such a thing; but I found it was difficult for dentists to entertain or get hold of that proposition, that the calcification of the teeth or the amount of lime-salts or the hardness of it has no relation whatever to caries of the teeth. These teeth that you speak of as soft teeth,—leathery decay, you say,—that is the carious portion of the tooth. The tooth was not soft; the portions that are not decayed are not soft. There is a difference in the density of teeth, of course, but very slight. There is a considerable difference in the strain they will bear. The tables in the COSMOS show that there is this difference; but the difference is not so much with the lime-salts. These things are not related to the diseases of the teeth; but in that I do not say that the teeth of certain individuals do not decay more rapidly than the teeth of others. I have families under my charge whose teeth will melt down in spite of me. The decay will start anywhere apparently. The only thing I can do is to cover them bodily with gold. It is not because the teeth are soft, but it is a constitutional condition, just as much as rheumatism is a dyscrasia.

It is the fluids of the mouth; it is the fluids of the body. I do not know whether they act through the teeth as they circulate there. I do not think so, but we will find out one of these days through that wonderful serum pathology that is being developed. If we find it and are able to control it, we may inject our patients with a control for caries, as well as with a control for diphtheria and various other maladies. Of course, this study of serum pathology is in its infancy as yet, but we expect wonderful things from it. I think we will some day find it relates to caries of the teeth as well as to other things. We can only surmise now, but we know those differences exist, not in the teeth, but in the constitutional disposition to caries running through families. It is inherited, and we will have to combat it. But do not combat it by telling the patient that his or her teeth are soft and must decay, or by using inferior filling-materials, or something that you can do easily. Go to work on the bad case and see what you can do with it. Do not consider it a case that is lost, for those conditions are changeable. I could speak to you of case after case on this point, of the immunity established, and then again, after years, perhaps, suddenly decay breaks out again. It is not the teeth, but a constitutional dyscrasia. I do not know where to find it. We must wait for the progress of science to find it. Let us clear up this other thing that we do know. If you can understand that and act upon it, I will feel that I have accomplished a great deal.

We must get closer together on the subject of fillings. I do not know yet what the density of fillings should be. It is certain that a filling in an approximate surface of a tooth, or upon one of the sides where stress does not come upon it, does not require to be as dense as a filling upon which stress does come. How little density will do is another thing entirely, and we shall have to find that out. A filling that absorbs moisture readily ought not to be used. We ought to know what density is required in a person who uses ordinary stress in mastication, and we ought to know readily and quickly when a patient comes to us who will bite down two hundred and fifty pounds or more. We try and try again to make fillings that will last; but we ought to know at once. Another point in regard to something that has been said this evening: We see old-style fillings,—soft gold fillings that have been in for many years,—and we can run a probe into them. It is true. We see the old amalgam fillings that have preserved teeth for forty or fifty years. Do you ever think of the vast number of fillings of which these are the only remains? Those old fillings did not have the percentage of adaptability that our fillings of to-day do, made of cohesive gold. In fifty years from now, people will point to the fillings of Dr. Northrop and others as monuments of their skill, because they have lasted so long; but that does not argue that your fillings are the best that can be made, because a few go down to posterity preserving the teeth. Think of the hundreds that have failed on the way! We do best when we count our failures. I can show you amalgam fillings with perfect margins standing ten years or more, but those are not the ones we want to know about. We want to know what proportion of them last. When I count the amalgam fillings put in ten years ago that have perfect margins to-day, the proportion is very small. We want to study this subject practically, and in such a form that we can know what we are doing and be able, as the years roll on, to teach it to our students and to posterity. We want to find the best density of gold fillings for each case according to the stress that will come upon it. Not that you and I are going to be much improved by this; that is out of the question. But there is a future generation of dentists growing up. We want to learn this for the purpose of teaching it, and letting it grow like a tree into greater and greater perfection as the world moves. This is what we are all striving for. We want a plan of teaching by which we can make better and better dentists in the future, and to do this we must have something else besides clinical observation,—something that is more certain. Clinical observation is continually getting lost.

I was once sailing with a gentleman who was not himself a sailor. We were fishing on the islands on the north of Lake Huron. We went out fifteen or twenty miles, and were wandering among islands, fishing on the way, and then, when evening came, it was suggested that we go home. I took the rudder, sail was set, and we started. He said, "Hold on; you are going the wrong way." I said I was not; he said I was, and so we contended. Finding that we would not arrive at any conclusion that way, I commenced to look around for some basis of argument. He said we came east. "Then," said I, "to go back we will go west. Look at the ship's compass." He did so and said, "Why, that thing must be wrong."

Gentlemen, you laugh at this story. A man would be in a poor fix without the sense of direction. So we would be in very bad condition as dentists without clinical observation; but we often go astray in clinical observation. We get lost, and we need something to set us right; something that we can depend upon. This matter in regard to soft teeth and *hard* teeth is one of those things upon which we have got lost. We need the instruments that are intended to aid our natural senses. They simply extend our senses; that is all.

A vote of thanks was tendered to Dr. Black.

Adjournment.

JOHN I. HART,
Editor Odontological Society.

FIRST DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

THE First District Dental Society of the State of New York held a regular monthly meeting Tuesday evening, January 14, 1896, at the New York Academy of Medicine, No. 17 West Forty-third street; the president, Dr. JOHN I. HART, in the chair.

The president extended a most cordial welcome to the members of the Second District Dental Society of the State of New York and of the Central Dental Association of Northern New Jersey, who were present by invitation, and invited the presidents of these two societies to take seats on the platform.

Dr. J. N. CROUSE, of Chicago, addressed the meeting in regard to the work of the Dental Protective Association, at the conclusion of which address Drs. F. Milton Smith, Louis C. LeRoy, and M. L. Rhein were appointed a committee to solicit members for the Protective Association.

Dr. GEORGE S. ALLAN, of New York, then read the paper of the evening, the subject being, "The Contour Filling—A Study."*

Discussion.

Dr. S. FREEMAN. The essayist advocates the use of copper amalgam for its toxic effect upon tooth-structure, and, having obtained this condition, he removes the copper amalgam and fills the tooth with gold. I would ask Dr. Allan if he has ever used any of the antiseptics, such as aristol and europhene, for this purpose, and what were the results?

Dr. ALLAN. I have used experimentally a great number of germicides and antiseptics, and endeavored to test clinically their respective merits. The results obtained seem to have been of a temporary character in most cases; that is to say, the pathogenic germs would be destroyed or their growth stopped for the time being, but the parts acted on would not be left in a permanently aseptic condition. I do not know of any germicide that fully meets our wants,—one that will not only kill germs, but at the same time inhibit their growth later on and further leave no bad conditions to offset their good effects. Copper amalgam and the copper salts promise well in that they are most destructive to germ life, and the compounds they form with organic matter seem to be permanent and aseptic in their nature.

Dr. J. F. P. HODSON. For many years, twenty at least, I have used carbolic acid to thoroughly soak the completely dried interior of all cavities immediately before filling. While I am aware of the fact that it was long ago proven to be more or less evanescent in its qualities as a germicide, if I have destroyed the germ life in the cavity until my hermetical stopping is in place, it is all I ask. I feel quite independent of germicides thereafter in that cavity.

Another reason, however, for which I used it in former years holds me to it still more strongly, and this I said fully twenty years ago, which is, that the contents of the dentinal tubuli opening into the cavity are coagulated by it for a tiny distance from the surface of the cavity toward the pulp, and so form a non-conducting head in each one of those canals. I believe that I thus produce an efficient and permanent non-conductor, lining the entire cavity, and without using up cavity depth required for the retention of the gold, as would often result from the employment of more tangible non-conductors.

---

* Printed in full at page 321 of the current number.

Dr. J. MORGAN HOWE. I have listened to Dr. Allan's paper with much interest, and am pleased with his acceptance of the principle of contour fillings in the main. I think, however, that there was a lack in his statement of equation, at least it so appeared to me, that he did not consider at all the relation of filling-material to different qualities of tooth-structure. It seemed to me that due weight has never been given to the question of the electrical relation of filling-material to tooth-bone, and that as bad conditions increase, that is, as the quality of tooth-bone is lowered, skill becomes of relatively less consequence than knowledge; I mean that dexterity in the use of material and instruments becomes, in the presence of the worst conditions, of less consequence than knowledge of what to use. There was suggested to my mind, as I have listened to Dr. Allan, that there were many cases in which I would rather make a contour filling of oxyphosphate than to make a filling that was not contoured of some more durable material whose electrical relation to tooth-bone would be more negative. The principles that govern those questions have been ably presented by Dr. S. B. Palmer at different times, and I refer to them because I have thought they have received much less attention than they should. Generalizations on the subject of saving teeth by means of fillings can hardly be made without considering these relations of the new material to that with which it is brought into contact.

Dr. ALLAN. If Dr. Howe will put his bad conditions at a maximum and his skill at nearly a minimum, and multiply it by his constants, he will get just the result that he has referred to. I think that equation covers every possible combination that one can mention in making a contour filling. As to the factor of electrical conditions, that would become a part of the bad conditions. I did not go into details at all, and I am sorry that Dr. Howe thought I in any way did not accept the contour filling. I tried to disassociate myself entirely from the principle being a good or a bad one, or whether I believed in the contour filling or not. The question is whether that equation is a good one or not. Can it be pulled to pieces or not? There are no details given. It is only presented as a problem, and a study, disassociated from you or me or any dentist.

Dr. E. A. BOGUE. When Dr. Allan brought up his constants and bad conditions, I got into trouble. Constants, according to him, are gold, amalgam, and oxyphosphates. How many kinds of gold? Are they hard or soft? Do we know what we are using all the time? Is any amalgam in use a constant quantity? Is any phosphate cement? The inconstant condition, yes. Materials as well a patients are all inconstant.

When Dr. Allan said that some people wanted to go back and find how we should make our operations by an examination of Nature, I, metaphorically, took my hat off in silent homage, and as I happen to have spoken before some of the gentlemen here in regard to one or two cases that have come under my observation, I put into my pocket to-night two models that bear on that question seriously, and, with your permission, I will present them to you.

One of these models is the case of a gentleman, fifty-three years of age, who gave me his word of honor that he had never had a tooth-brush in his mouth. I have exhibited this cast to a number of patients as well as professional men, and occasionally met with the expression, "How nasty!" Quite a mistake. It was not nasty. It was as clean a mouth as I ever saw, just because the conditions of formation and development of those teeth and the arrangement of them was so ideally perfect that the very act of mastication cleansed them, and rinsing the mouth with water was sufficient to keep the mouth in an admirable condition. An hour and a half's careful searching showed me but one very small cavity, and that one was where a dentist of St. Petersburg had filed between two teeth.

We are confronted with deviations from that condition day by day, and when we are, if we know what an ideally perfect condition is, we can guide ourselves accordingly.

The other cast is that of a lady in whose mouth a lower second bicuspid failed to develop on the left-hand side. The result is such malarticulation and such irregularity that the patient has never chewed on that side of the mouth, and yet the loss of substance is only one small bicuspid. Are we not bound, therefore, to restore our contour and position as far as possible according to the ideal condition?

A vote of thanks was tendered to Dr. Allan for his very interesting paper, after which, there being no further business, the meeting adjourned. B. C. NASH, *Secretary.*

ACADEMY OF STOMATOLOGY.

A REGULAR meeting of the Academy was held at its rooms, 1733 Chestnut street, Philadelphia, January 28, 1896.

After the transaction of the usual routine business Dr. E. S. TALBOT, of Chicago, read a paper upon the subject, "Pyorrhea Alveolaris."*

Discussion.

Dr. WM. H. TRUEMAN. Certain expressions in the short abstract from the paper given reminded me of a paper written by Dr. Hayden upon pyorrhea alveolaris in the *American Journal of Dental Science*, and I think it is of interest to refer to it. I think it is page 214, March number, 1822. Dr. Koecker wrote a paper reflecting upon Dr. Hayden, asserting that Dr. Hayden didn't understand the nature of the disease. That prompted Dr. Hayden to look the matter up very closely in 1822, and the result of his study was published in the *Medical Recorder* of Philadelphia. He gives, I think, the most exhaustive history of the disease I have ever seen, and, reading it over and reading Dr. Talbot's paper over, I am quite sure that the two men may, so to speak, be able to shake hands over a chasm of more than seventy years. I am somewhat inclined to think that both of them have come to the same conclusion.

---

* For Dr. Talbot's paper see page 310, this issue.

Dr. Talbot states that the disease is increasing. I think that would be the sentiment of every dentist who has been twoscore years in successful practice; it may be the case when a dentist has many patients with the disease, it gives him the impression that it is increasing. I don't think so; neither do I think it is due to dental operations, from the fact of all the old writers speaking of it as very prevalent and very destructive to the teeth, so much so that they termed it devastation of the teeth, and that a hundred years ago was about the same expression as is now applied to pyorrhea alveolaris.

It is a question with me, in many cases, where the pathological condition begins. In early life sometimes the gum-margins are receding, perfectly healthy in color, and it continues to such an extent that the teeth become loose, and then results a pathological condition due to the loosening of the teeth. I have found where the teeth are mechanically held firm the pathological conditions subside.

In regard to the gouty diathesis, I haven't seen anything to lead me to think it has anything to do with it. I have seen conditions of the mouth, strongly marked pyorrhea, and no other symptoms of uric-acid diathesis; in many cases I have put patients under lithia treatment, without noticing any benefit at all. In several cases where patients led a very sedentary life I got them to change, and it brought a very marked improvement.

With regard to the cure of the disease, I think there is but one, and that is the forceps. I have never seen a case that has been cured.

As long as the treatment is continued there is improvement; if the treatment is discontinued they come back again. I have noticed that. I have been impressed that if the teeth are held firm, that goes a long way toward effecting a cure. I have tied them with a ligature in many cases, with great improvement, and in a number of cases recently, probably eight or ten, I have drilled holes through them and put in a bar and held them perfectly firm.

I had a case some time ago that was cured spontaneously, without any treatment whatever. A patient had been coming to me for some time, a man about thirty years of age, and finally the trouble reached such a stage I told him I could do nothing for it, and if any one could to let him have a chance; the teeth were loose all around, above and below, the pus was exuding, and the mouth in a very unhealthy condition. He had always taken good care of his teeth. I saw him again in a year, or maybe over that, and there was the greatest change, and there was very little recession of the gums. He had in the mean time made no change in his mode of living, and had not been under medical treatment.

There are some cases where, under this condition, the teeth are removed and the roots are perfectly smooth, and in other cases absorption has gone on, leaving them like needle-points. I would like to know what the cause of that is.

Dr. W. G. A. BONWILL. I read Dr. Talbot's paper before I came here. You all know my treatment in regard to pyorrhea. Dr. Talbot's paper reaches some points very clearly. I can't agree with him as far as his treatment is concerned. It is time some of us had learned to treat pyorrhea. Of the number of teeth he had extracted, I find in his essay that fifty per cent. came from his own office. I should judge from that he had not much success in the treatment of his cases. I can agree with him in one thing, so far as I believe and have seen, and that is, his view of the hypothesis in regard to gouty diathesis. I don't see it, and never had occasion to see the etiology of the disease in that light.

I don't agree with him that it commences on the gums on the alveolar border. I don't agree with him that the deposit should be left there. That is a very ultra measure. Even he wouldn't like us to think he advocated it. I wouldn't like to believe that any one would do it. I don't like to see a man with good sense recommending any such treatment.

I agree with him that bad dentistry has done more than almost any other one thing. It is not necessary to state in what way, but he doesn't tell us what is good dentistry, and how to cure it by good dentistry. I have no doubt all his cases could have been cured.

I am a little surprised at the doctor using iodin. In my practice the use of it is almost obsolete. Long, long ago, I abandoned its use.

There are a great many points that might be taken up, but the whole thing has been discussed over and over again, and nobody seems to come down to the fact that pyorrhea can be cured. I feel that he leaves us just where he found us.

I treat pyorrheal pockets as fistulas ; when you have once done it let nature alone. I treat the case surgically, burn it out, treat it as a fistula in any other part of the body. Do your work right, and nature does the rest.

I had a case sent to me by a dentist in Philadelphia. He told the patient he could do no more. Really, there was no trouble, but the dentist had kept him running to his office constantly. He dabbled in it so often, nature had no chance to make a cure. In three treatments, two hours the first time, I went right through the whole thing, burned it out as if I were burning out a cancer ; then let him come back in a few weeks ; and, as there was no further trouble, I sent the gentleman back to his dentist with my compliments.

At some future time I shall write up what I have to say on this subject.

Dr. D. D. SMITH. There are points in connection with this subject which have never been taken account of, so far as I know, or if they have, there has not been sufficient emphasis placed upon these points. Dr. Talbot touched on some of them to-night, and what he said in regard to them agreed mainly with my experience in connection with the disease.

In the first place, there is the age of the patient to be taken into consideration. We talk of this disease as if it were like decay, finding expression in every mouth, in the mouth of the young subject, and in the temporary teeth. Often I have heard it declared it has been found in the temporary teeth, and also in old age.

In my experience it is confined absolutely to middle life, just at the age where we don't want to find it. We don't find it in young subjects. Dr. Talbot's paper speaks of the disease being found in connection with a person fifteen years of age. In a practice of thirty-three years I have failed to find it in a patient as young as this. I don't remember ever seeing it in a case of twenty years of age ; possibly I may have. Persons who give expression to this disease are people well along in years,—from twenty-five to forty years ; there is where we find it most, the true expressions of it.

Another point I failed to notice in his paper is, I have no hesitation in saying, that it is always found in connection with good teeth, teeth exempt from decay. He speaks of the teeth coming out smooth without any deposit on the roots. So they do. We find just that condition of things. But what sort of teeth are they? They are teeth that have never decayed or have ceased to decay ; they are teeth without an expression of decay about them. They may possibly have been filled, but for years they have ceased to decay. I have never found it associated with poor teeth and teeth liable to decay.

If this is the case, it cannot be from uric-acid poisoning. It cannot be from irritation of the gums from a local irritant, or a constitutional irritant which expresses itself at the margin of the gum. There must be something else associated with it.

Another thing—How does this disease attack the teeth? From what we hear from the papers and discussions, we might suppose the disease attacked the teeth anywhere on the roots. Where does it come? Between the teeth. What else do the teeth do? They turn and twist in their sockets as if there was some irresistible force expelling them outward or inward. That is the case. There is a force at work on the roots of the teeth which is actually twisting them out of their alveolar sockets. What is it? What does it? Why is it always associated with good teeth? You have all seen a central incisor attacked. Where? On the mesial portion of the root, twisting that tooth out and rotating it in its socket, and you will find in all these cases that there is an opening between the two teeth ; in every case a space between the two. The teeth are forced in the direction of the least resistance, whatever that may be. If it is a lateral attacked it is almost always attacked on the distal face, and if it is a central it is almost universally attacked on its mesial face and forced backward. What occasions this? Here in the paper we see nothing of this particular expression of the disease in connection with strong, sound teeth.

In regard to tobacco, I have this to say, that while its use is an exceedingly filthy habit, I have never seen any ill effects from chewing tobacco except wearing down the teeth. I frequently recommend my patients to chew gum,—my young patients. I think it is one of the best things to make good teeth. The essayist speaks about rubber-dam being one of the exciting causes. I cannot agree with him. I don't believe rubber-dam ever did such a thing in the world as to excite pyorrhea. As to regulating appliances, they are used almost always in connection with children. I have never found pyorrhea in connection with young people. I cut off these pyorrheal teeth and put on bridge-work on purpose to save them, and do it effectually. As to pregnancy, why should it be an exciting cause? Pregnancy is often the cause of decay of the teeth. We always look for it and expect to find it.

While I agree with Dr. Talbot in many respects, I don't agree with him as to the exciting causes. I think the root of the trouble lies in the dental pulp. Investigation on the subject will go to show that the dental pulp is at fault in connection with pyorrhea, where it exists in its true form, in the solid teeth of mature life. It has made the tooth too solid, it has made it of too good material, and the result is that the pericemental membrane becomes irritated and begins to withdraw itself; and it is just like any other irritant anywhere else, and nature begins to throw it out, and begins at the weakest point. That is why the twisting and turning occurs. What proof have we of this? I don't say it is all the dental pulp, but I believe the dental pulp is at fault. It has overdone its work, it has made the tooth itself a local irritant, and nature is making an effort to throw it out.

In the case of a good, healthy tooth with a devitalized pulp, you will never find pyorrhea attacking it, no matter even in a mouth where pyorrhea is running a full and free course; the devitalized tooth will be exempt. Why? Simply because the cemental structure about the root of the tooth is in its normal condition. There is nothing to interfere with it, and it remains there for the support of that tooth.

I can't fight pyorrhea as Dr. Bonwill does, burn it out and let it go; it won't do it for me. In one case I treated a patient for a number of years, and finally drilled into the pulp and destroyed it. That did not bring the tooth back. It stayed out in that twisted position, and finally I cut it off and put on a crown, and it will take a dentist to know there has been anything done in that mouth. The disease seems to be cured.

Dr. JAMES TRUMAN. I hardly feel like saying a word, and I hardly think I would do so were it not for the fact that my friend Dr. Talbot has come here with a paper that I most fully indorse.

It is a gratification to me to listen to it, because it is what I would call thoroughly scientific. He has searched for the truth through proper channels. The chemical experiments he made in Chicago confirm my own views that the uric-acid theory never had any firm basis as a theory of the etiology of pyorrhea. I never could see it.

There has been much said on the subject here in Philadelphia. We have all written and spoken on it, and we never will agree. I don't even agree with Dr. Talbot exactly that it begins in the gum-tissue. I fully agree with him that the deposits really have very little to do with it; in fact, you can treat a case of pyorrhea without removing the deposits. I know that is radical. I am a little surprised to hear Dr. Talbot take that position, but I believe it to be a true position; that the deposits are simply secondary, and that it has little to do with the progress of the disease. The disease is primarily caused by micro-organisms. That, I think, I settled to my own satisfaction twenty-five years ago in microscopical examinations, and I have never seen any reason to change it. I know very well that in the treatment of this disease you must first attack those pathogenic germs which exist around the gingival border if you are going to have success, and it is astonishing to me to hear a man say, who has been in practice as long as my friend William Trueman has, that nothing but the forceps will relieve this trouble. Where are we? What are we here for as dentists if we can't do any better than that? Now, as far as I am concerned, I must say that each case can be treated profitably, but it must be treated right. It can be brought to health if it is treated properly, but they must be treated thoroughly and carefully. I have a tooth in my own mouth which I treated twenty-five years ago for pyorrhea, and it is there yet, and it will probably remain there as long as I remain on this planet.

As to its not appearing except in middle life, I have treated some very bad cases at twenty years of age, and successfully.

We will never come to any agreement on this matter until we come down to a clear understanding of the etiology of the whole matter. I am satisfied with the treatment I gave to the profession long ago.

Dr. E. T. Darby. I have listened to Dr. Talbot's paper, and I think he is right; and when I hear Dr. Peirce, I think he is right; and I think they are both right. I don't believe all cases of pyorrhea are from the same cause. I believe most fully that some cases have their origin below the gingivæ and express themselves in little tumors along the gum-border. That is the incipiency of the disease. I have thought the inflammation was the result of the density of the roots sometimes. I have seen other cases of pyorrhea such as Dr. Talbot describes, when I thought the origin of the disease was at the gingivæ. In some points I think Dr. Talbot is right; in some I think he is wrong.

As to the cure, I occupy a middle position. I believe pyorrhea, before it has progressed too far, can be cured, substantially, but all cases of pyorrhea that have come to my hands have required subsequent and constant treatment. I don't think it can be cured in one or ten sittings, either at intervals of six or ten months or ten years. But I should be sorry to believe that the forceps are the only remedy we have for many of the cases that come to us.

I cannot agree with Dr. Smith that the disease always comes, necessarily, on the mesial surface. I have frequently noticed it beginning at the palatal surface. Neither can I agree with him that it is always on the approximal surface in regard to the posterior teeth. I have seen the disease start upon the palatal root more frequently than elsewhere, and that root become perhaps entirely denuded before the disease manifested itself elsewhere around the gingivæ.

Dr. H. H. Burchard. A full and adequate discussion of Dr. Talbot's paper would be more lengthy than the essay itself, as it involves the long list of disorders known to produce the condition called pyorrhea alveolaris. I notice one point in his investigations which I had marked out for my next summer's work,—the influence of tabes dorsalis upon disorders of the teeth. I was, however, and am, prepared to look for more extensive trophic changes due to tabes. It would be curious indeed were the fifth cranial nerve to be exempt from degenerative changes in a disorder which involves many of the others. When we read Dr. Talbot's paper in print and deliberately examine his data, I believe we will find he has contributed some valuable material to the subject of the pathology of gout.

Hearing the discussion of one of the early papers of Professor Peirce upon this subject, it became evident that some of his critics did not pay sufficient attention to the clinical history and morbid anatomy described by him, in which he clearly differentiated between two diseases; the first a pyorrhea beginning as a marginal gingivitis and accompanied by the deposit of dark, scaly, and hard bodies beneath the gum-margin, this being the starting-point of an inflammatory degeneration of pericementum which eventually caused the loss of the tooth, the second class those which he described as accompanying and due to the gouty diathesis, these having the incipiency of the dental disease at some portion of the pericementum beyond the gum border. I have seen and recorded such cases, one where there was a well-defined calculus formed upon the upper, the apical portion of the pericementum, the membrane beyond the deposit toward the neck of the tooth being intact. The next case was one in which there was no inflammatory disturbance of the gingivæ, but half-way toward the apices of the roots of two teeth were swellings, inflammatory tumors, which, when incised, showed the roots of the teeth to be denuded of the pericementum and a partial loss of the alveolar walls; these two cases are cited as being distinctive examples of correspondence with the morbid joint anatomy of other parts found accompanying gout. That all persons who are the subjects of the gouty diathesis are not the victims of pyorrhea or phagedenic pericementitis is no sufficient argument against this special constitutional condition being a predisposing and exciting cause of the dental disease. Many patients who are evidently and markedly gouty never have any inflammatory disturbance of the metatarso-phalangeal articulation. It exhibits itself in the retaining structures, the articulative tissues of the teeth, because this happens to be the weak joint, a locus minoris resistentiæ. Why this is a weak joint I have endeavored to explain in papers written for the Cosmos and for the Philadelphia County Medical Society, and have as yet found no reason to alter the opinions advanced in those essays; in fact, time and other essays upon this matter confirm the hypothesis.

In regard to the small percentage of cases exhibiting the murexid reaction, Dr. Kirk and myself noted this soon after the publication of Professor Peirce's essay, finding many of the deposits giving alone the reaction of calcium phosphate; however, several of these cases were those of patients markedly gouty, having a family and personal history of gout.

It is unquestionably true that deposits occur upon the lateral aspects of the roots of teeth without detachment of the gum from the necks of the teeth; secondly, it is equally true that inflammatory disturbance and abscess may occur in similar situations, without the pulp of the tooth being dead; several such cases are recorded in the proceedings of this Academy.

Teeth may be lost through the progressive molecular loss of their retentive apparatus, and not have their roots the seat of deposits. Many cases are recorded which resisted purely local treatment, and yet were clearly benefited through the patients' adherence to an anti-gout regimen and by anti-gout therapeusis. As to the pathology involved, I have believed for the past two years the following to furnish a rational explanation. The pericementum, for reasons which I advanced nearly two years ago, becomes in some persons a weak articulative tissue. The blood-vessels supplying it are, owing to causes which underlie the gouty condition itself, the seat of inflammation; through the swelling of the tunica media the lumen of a vessel or of vessels becomes obstructed, and there is a death of cellular elements dependent upon that vessel for nutrition. That is, a greater or less area of pericementum dies.

In this area, whether due to some special selective affinity or to an acid reaction of the dead tissues, a deposit of urates occurs. This may receive fresh accretions through subsequent attacks, and, during its presence, a greater or less degree of irritation is kept up and inflammatory degeneration of the tissues about it occurs.

This corresponds closely with the history of a gouty affection in any other part.

For a solution of the pathology involved in the loss of teeth from deposits which are first found just beneath the gum-margin, we need look for no constitutional condition as explanatory ; local causes furnish a perfectly rational explanation for it ; however, I have seen many of these cases which occurred in gouty patients. Given lactic fermentation, which is present in all mouths perhaps, and coagula are formed by the action of dilute lactic acid upon the mucin of the several secretions about the mouth, and the lime-salts of the saliva are precipitated and entangled in the coagulum, and in any spot where these particles may find lodgment there is a nidus about which will form calculus. Beneath the margin of the gum they act as irritants ; the mucous glands have an altered secretion, and this reacts upon the soft deposits, altering their chemical and physical structures ; a gingivitis supervenes, the gum-tissue swells and is detached from the neck of the tooth, and micro-organisms have a pocket in which to develop. It is not unlikely that the streptococci invading such areas may give rise to phagedenia. In any event, the pathology differs from that of the loss of teeth by the gradual encroachment of salivary calculus only in anatomical situation, and not in the essence of the process.

There is one point in regard to this matter which needs an emphasis which I endeavored to place upon it in an article in the *International Dental Journal* last year, and that is, even though the case be gouty, it is possible by the perfect removal of deposits, the securing of surgical rest, and local asepsis such cases may be cured for the time being, but there is no assurance that the disease will not reappear with the pathological conditions which precede an attack of gout.

No doubt we all agree with Dr. Younger in this matter, that the essential thing is to get rid of the deposits. I have written somewhat extensively upon this subject, and have made careful examination of many cases, as to clinical and family history, and I am more and more inclined to adhere to the doctrines I have already advanced, which were prompted mainly by the teachings of Dr. Peirce and later by a paper of Dr. Reese ; this essay, however, antedated that of Dr. Peirce's by several years.

In regard to Dr. Talbot's asserted belief that the deposits found in the general class of disorders characterized by pyorrhea alveolaris are unirritating, I do not think he will have the concurrent opinion of clinicians in general. His analogy of the exostoses does not hold ; the calcic salts deposited in this hypertrophic condition are probably in the form of calcoglobulin ; those deposited as precipitates from chemical solution are physically irritating in themselves ; besides, even an exostosis is due to irritation, and clinical evidences show it perpetuates the irritation.

Dr. Talbot. There is one point in regard to pyorrhea advanced by Dr. Peirce that I do not understand. I cannot understand how, if the disease is constitutional, the deposit will take place on one tooth and on one side of a tooth, and not on the other. I cannot understand why these men who advocate constitutional treatment are so positive in their local treatment. If it is constitutional, it must be treated constitutionally. Simply removing the calcic deposit from the root of the tooth does not cure the disease if it is constitutional. That certainly knocks that theory all to pieces.

In regard to the use of iodin, Dr. Bonwill wants to know when I would stop. I know by each particular case when to stop. I did not advocate it in a medical way. With iodin you can make the gum tight around the root, and the pus-germs cannot enter.

In regard to hard teeth spoken of by Dr. Smith, there is no doubt but that persons with such teeth suffer most from this disease. He says the pulp has something to do with it. The pulp has nothing to do with it. The pulp recedes. The tubuli of the dentine are filled in with secondary material, and the tissues are harder. What becomes of the pericemental membrane? It has lost its office. The membrane has lost its function. Is that reasonable?

When I come to a meeting I try to relate facts; there is no guesswork about it. I state what I know. I thank you for your kindness, and am much obliged to you for your discussion.

Dr. JAMES TRUMAN moved that the thanks of the society be voted to Dr. Talbot. Carried.

Meeting adjourned. GEORGE D. B. DARBY, *Secretary*.

AMERICAN DENTAL ASSOCIATION.

(Continued from page 173.)

FOURTH DAY—*Morning Session.*

THE association was called to order at 9.30 A.M.; Vice-President Watkins in the chair.

Dr. J. N. CROUSE, Chicago, chairman of the Executive Commiitee, reported recommending that the report of the Committee on the Wells Memorial be referred back to the Memorial Committee, and that the association appropriate two hundred and fifty dollars for the memorial, to be paid upon the completion of the work. Adopted.

A paper by Dr. L. E. CUSTER, of Dayton, O., entitled, "The Electric Oven," was reported by Section I, and read by title.

Dr. CUSTER described his invention as a flask-shaped oven whose inner walls are thickly covered with platino-iridium wires which, when heated by an electric current, radiate their heat directly into the oven cavity. He then described its advantages in detail, summarizing the points as follows:

"It makes no noise or dirt, and does not heat up the room; requires no attention until the fusing point is reached; is compact and may be placed in the operating-room. The heat is without gas or odor; any degree of heat up to the melting point of platinum can be obtained. By means of the rheostat the heat may be varied at will, or it may be held at one point indefinitely. By the arrangement of two sight openings the eye is not blinded by the heat, and being but a few inches from the melting porcelain, sees clearly the fusing as it progresses. Upon turning the current off, the case immediately begins to cool, which makes an overfuse impossible, and at the same time secures the brilliancy of the gum color. The porcelain, both body and gum, seems to improve in the electric oven. The appliance consumes so little current that it is not only cheap in operation, but can be connected to any electric fixture of the building without separate wiring.

"In short, it is not claiming too much to say that the electric oven is the ideal the porcelain worker has long sought."

Dr. Louis Ottofy, Chicago, offered the following :

Whereas, Dr. Levitt E. Custer, of Dayton, O., made public his invention of an electric oven for the fusing of porcelain, and demonstrated the process in Chicago, October 4, 1894, and at the Ohio State Dental Society, December 5, 1894 ; and

Whereas, Dr. W. H. Taggart, of Chicago, also claims the originality for this invention, but did not make the process public until February, 1895, also exhibiting the oven in May, 1895 ; therefore be it

Resolved, That it is the sense of this association that inasmuch as both of these gentlemen are claimants for the honor of the invention, the matter shall be referred to a committee of three, with instructions to investigate it, and to report to this association at the next annual meeting.

The resolution was adopted, and the following appointed to serve upon the committee : Drs. Frank Holland, Atlanta, Ga. ; J. G. Palmer, New York, N. Y. ; Grant Molyneaux, Cincinnati, O.

Dr. Edward C. Kirk, Philadelphia, read the report of the Committee on State and Local Organization, which stated that copies of the list of topics had been forwarded to the various state and local societies, acceptances received from twenty-six, and reports of discussions upon the topics from the Massachusetts Dental Society, New Jersey State Dental Society, Kansas State Dental Association, Chicago Dental Society, Washington City Dental Society, and Connecticut State Dental Association. A number of other reports promised, but not furnished for lack of time, are expected later.

The committee proposed to refer the reports already received to the various Sections to be incorporated in the Section reports for ensuing year, for final discussion by the association at the next annual meeting. The report also recommended that the work be continued upon the same lines.

The report was adopted and the committee continued.

Dr. J. Taft, Cincinnati, O, from the Committee on Necrology, reported an appropriate minute concerning the deaths of Drs. John J. R. Patrick, of Belleville, Ill., and W. O. Kulp, of Davenport, Ia., which was adopted.

Dr. Thomas Fillebrown, Boston, Mass., from the special Committee on the Union of the Southern and American Dental Associations, reported progress, and asked for further time, inasmuch as there had been no meeting of the Southern Dental Association since the appointment of the committee on the part of the American Dental Association. The request was granted.

On motion of Dr. L. D. Shepard, of Boston, thirty minutes were granted for the presentation of matters connected with the Dental Protective Association, by Dr. J. N. Crouse, its chairman, and others.

Dr. J. N. CROUSE stated that they had discovered that the contract between the International Crown Co. and Dr. Low was merely a contract for the former to collect royalties, and that eventually the title would revert to Low; that in some places the title was still in Low. The case would be argued, it was expected, before Judge Wheeler, at Brooklyn. Dr. Crouse had been called to New York several times in the expectation that the case would be called, and on complaining of the inconvenience thus put upon him, the judge had promised that he should not again be summoned until the case could go on, and that he should have thirty days' notice of the date. He was now expecting the notice within a short time, and the case would probably be called in October. The association also has suits pending upon the Stedman removable bridge, upon the Land inlay, and upon the Chase combination. We are not through with the litigation, and it is imperative that we increase our membership.

Dr. LOUIS JACK, Philadelphia, offered a resolution recommending that each dental society in the country appoint one of its members to solicit members for the Dental Protective Association.

Dr. FRANK ABBOTT, New York, was interested in this matter as a point of honor and for the interest of the profession. We want to see this thing stopped of having patents taken out on things which have no business to be patented. The question naturally arises, What has been done with the money paid into the Dental Protective Association? Those not familiar with the work that has been done will be surprised at the statement that the association has saved to the profession six million dollars and has spent less than twenty thousand.

Dr. H. J. MCKELLOPS, St. Louis, Mo. The dental profession doesn't seem to have any idea of what Dr. Crouse has been doing. He recalled the fact that the Goodyear Dental Vulcanite Co., under Josiah Bacon's management, had cost each member of the dental profession who used their patents from ten to one hundred and fifty dollars a year. All that is asked here is a single payment of ten dollars from each member of the profession to the Dental Protective Association. Every man should take the matter up and work until every member of the profession has joined the Protective Association.

Dr. SHEPARD. At the meeting of the Dental Protective Association yesterday there was great enthusiasm. The importance of the work, and justice to Dr. Crouse, demanded that some one else take the burden of soliciting members off his shoulders. It is not merely money for this one suit that is wanted. There are many others in different parts of the country which must be taken care of, —a dozen in Denver alone,—and other parties are only awaiting an opportunity to begin exacting tribute from the profession. One hundred thousand dollars securely invested will make every dentist in the land secure from unjust demands from any source. It would stop the bringing of suits against individuals in different portions of the country who are unable to afford the expense involved in the making of a proper defence, and then using the cumulative judgments thus obtained to show a judge trying a case in which a strong defence is being made that other judges have examined and passed upon the questions involved.

Dr. Jack's resolution was adopted.

Section V, Materia Medica and Therapeutics, was called, and Dr.

J. S. Cassidy, Covington, Ky., the chairman, read the report. Referring to the advances in the development of therapeutic drugs through the general acceptance of bactericidal dicta, he expressed the opinion that, while it would be too much to hope for general immunity from disease or even for cure under all circumstances, substances at least akin to the beau ideals of which we dream will ere long take their appropriate places. Whenever anything is really distinguished for superiority in a certain direction, some objection will be made to it and a substitute be sought for. One of the queer things appearing with the demand for iodoform substitutes is that they must all be more or less rich in iodin, though it does not follow that these must give up their iodin in order to be therapeutically active. Disinfectants as a rule either give to or take from the infectious matter their individual, equivalent radicals. Antiseptics, as iodoform, common salt, carbolic acid, etc., do not as a class lose their chemical identity by contact with organized material, but act in their capacity as compounds. We need not pay attention to the relative proportion of any element in a compound so far as the medicinal effects are concerned, unless the mode of action is by coincident decomposition of organized structure. One of the newest drugs belonging to this latter category is diiodoform (C_2I_4), although it bears no chemical relation to its well-known prototype. When presented in powder to freshly cut or abraded surfaces, or in chloroform solution into root-canals, it is a very good antiseptic. Either crystal or powder inserted dry into root-canals and fused by a hot broach resolves on cooling into a permanent insoluble, black, concrete mass. Its germicidal and disinfectant powers are weak.

Electrozone has proven to be an acceptable, inexpensive germicide and disinfectant. A twenty-five per cent. solution does good service as an injection into the antrum immediately after withdrawal of pus, being preferable to peroxid of hydrogen, inasmuch as it is not accompanied by a too rapid evolution of gas and consequent painful pressure in the cavity.

Many experiments during the past year with aqueous solutions of the gas formaldehyde have convinced the writer that as an embalmer of pulp débris it is superior to all other agents thus far employed exclusively for such purpose.

The report closes with thanks to Dr. Harlan for having called attention to trichloracetic acid ($C_2HCl_3O_2$). When properly diluted and applied to the inflamed parts its magic influence, owing to its solvent, caustic, stimulant, and astringent action combined, is so evident that a specific position in this hitherto rather barren field of therapeutics has been justly awarded it by those who have given it a fair and impartial trial.

A paper entitled "A Suggestion about Cocain," by Dr. G. E. Hunt, of Indianapolis, secretary of the Section, was read by title.

After animadverting upon the evil effects following the ignorant or careless use of cocain, Dr. Hunt stated that the maximum dose should be one-half grain. In the majority of cases an eighth or a quarter-grain will accomplish the desired result, while the maximum dose would be attended with at least temporary ill effects. In view of these facts he suggested that the per cent. solution be entirely ignored in using cocain *per se*, and that the intended dose be dissolved in an indefinite, convenient quantity of water, and the entire amount exhibited. This plan will impress *dosage* on the operator in a manner that no other method can succeed in doing. Another potent argument in favor of this is that every solution used is a fresh one. The drug should of course be measured accurately.

Dr. N. S. Hoff, Ann Arbor, wished to refer to one of the remedies mentioned by Dr. Cassidy. Formaldehyde or formalin is a powerful germicide, and one of the best agents we have for treating root-canals. For some time he had been experimenting with it in the obtunding of sensitive dentine, and had found a certain amount of beneficial effect. It is bibulous in character, and has a strong affinity for water. If allowed to remain for a considerable time in contact with the dentine it produces irritation, but by diluting with chloroform, twenty per cent. of formalin and eighty per cent. of chlorooform, and then adding cocain in various proportions, the irritating tendency was overcome and the obtundent result was obtained. He did not know that there was any specially good effect from the addition of the cocain, but with the chloroform he had found that the compound was less irritating, and the obtundent effect lasted longer. When used as an obtundent it should not be left in the cavity very long ; simply wipe out the cavity with the solution, and then dry out with a hot-air syringe. He had succeeded in this way in obtunding dentine very satisfactorily and quickly, but he had not experimented with it long enough to have definite data concerning it.

Dr. S. Eldred Gilbert, Philadelphia, wished to throw out a word of caution with reference to the use of formalin, as he had experimented with it and found that it was slightly dangerous to the pulp. He had removed partially devitalized pulps with it, bringing them away in a nice leathery condition. He had been using for some time in place of iodoform a preparation called loretin, with a good deal of satisfaction. It is odorless, and can be used in any place where iodoform is indicated. He has had good results from its use in abscessed and pulpless teeth. It seems to act more promptly than iodoform,—on ulcerated surfaces in particular very nicely.

Dr. Louis Jack, Philadelphia, suggested that when formalin is used for disinfecting the interior of the cavity, or upon the exposed surface of the pulp, it should be not stronger than a five per cent. solution.

The Section was passed.

(To be continued.)

NORTHEASTERN DENTAL ASSOCIATION.

At the union meeting of the Connecticut Valley and New England Dental Societies, held in Worcester, Mass., October, 1895, the question of consolidation was an important one. Committees from the two societies had been appointed the year previous looking toward that result. These committees made a favorable report, and presented a constitution and by-laws. Each society voted in favor of consolidation, and united in adopting the new constitution and by-laws, thus forming a new society of upwards of two hundred and fifty members, under the name of the Northeastern Dental Association. The following were the officers elected for the ensuing year :

Dr. James McManus, president, Hartford, Conn. ; Dr. James H. Daly, first vice-president, Boston, Mass. ; Dr. C. C. Barker, second vice-president, Meriden, Conn. ; Dr. Edgar O. Kinsman, secretary, Cambridge, Mass. ; Dr. A. J. Cutting, assistant secretary, Southington, Conn. ; Dr. Geo. A. Young, treasurer, Concord, N. H. ; Dr. C. W. Strang, editor, Bridgeport, Conn. ; Dr. Geo. F. Cheney, librarian, St Johnsbury, Vt.

The executive committee and section committee are appointed by the president, who selected the following :

Executive Committee—Drs. Geo. A. Maxfield (chairman), Holyoke, Mass. ; Geo. L. Parmele, Hartford, Conn. ; Geo. F. Cheney, St. Johnsbury, Vt. ; W. R. Blackstone, Manchester, N. H. ; S. G. Stevens, Boston, Mass. Section Committee—Section I, Dr. C. T. Stockwell, Springfield, Mass. ; Section II, Dr. C. A. Brackett, Newport, R. I. ; Section III, Dr. Wm. Jarvis, Claremont, N. H. ; Section IV, Dr. Thos. Fillebrown, Boston, Mass. ; Section V, Dr. E. S. Gaylord, New Haven, Conn.

The new society starts out harmoniously, and promises to be an important factor in dental circles in New England, and will doubtless shed its influence into the surrounding states.

EDGAR O. KINSMAN, *Secretary*,
15 Brattle square, Cambridge, Mass.

DENTAL SOCIETY ANNOUNCEMENTS.

INTERSTATE DENTAL MEETING.

THE Interstate Dental Meeting of Iowa, Nebraska, Kansas, and Missouri, will be held at Excelsior Springs, Mo., June 23-26, 1896. This, it is thought, will be the best meeting for years of the dental societies of these states, and it is hoped every dentist will attend. We want any new appliances you may have ; and if you cannot bring them, send them to Dr. J. H. Kennerly, No. 303 N. Grand avenue, St. Louis, Mo., who will take pleasure in exhibiting them and will return them to you at the close of the meeting.

H. H. SULLIVAN, *Recording Secretary*.

NORTH CAROLINA STATE DENTAL SOCIETY.

THE twenty-second annual meeting of the North Carolina State Dental Society will be held at the Atlantic Hotel, Morehead City, N. C., June 16 to 19, 1896. A cordial invitation is extended to members of the profession in good standing.

The State Board of Dental Examiners will meet at the same time and place to examine all applicants for license who wish to practice dentistry in North Carolina.

J. E. WYCHE, *Secretary*.

UNION CONVENTION IN WASHINGTON.

THE union meeting of the Maryland State Dental Association and the Washington City Dental Society will be held at Washington, D. C., May 8 and 9, 1896.

WILLIAMS DONNALLY, D.D.S.

ILLINOIS STATE DENTAL SOCIETY.

THE thirty-second annual meeting of the Illinois State Dental Society will be held in the Senate Chamber, Springfield, Ill., May 12 to 15, 1896. The Executive Committee has been especially fortunate in preparing a very interesting program. No member can afford to be absent. Dentists practicing in the state are cordially invited to attend, and, if possible, to become members of the society. The profession outside of the state is always welcome at these meetings. The hotels and railroads have granted the usual reduction. Pay full fare in coming and take receipt therefor; this, when countersigned by the secretary, entitles the holder to return at one-third the usual fare.

LOUIS OTTOFY, *Secretary*,
Masonic Temple, Chicago.

FLORIDA STATE DENTAL SOCIETY.

THE Florida State Dental Society will hold its thirteenth annual convention at Jacksonville, Fla., May 12 to 15 (inclusive), 1896. We hope that each member will be present or give a reasonable excuse for his absence, and that every member will exert himself in making this one of the most interesting and profitable meetings in the history of our society.

F. B. HANNAH, *President*.
W. S. TAYLOR, *Corresponding Secretary*.

DENTAL SOCIETY OF THE STATE OF NEW YORK.

THE twenty-eighth annual meeting of the above society will be held in Geological Hall, Albany, N. Y., on the 13th and 14th of May, 1896. The profession is invited to attend.

The following is the program: "Pyorrhea Alveolaris—its Causation, Diagnosis, and Treatment," C. N. Peirce, D.D.S., Philadelphia; "Professional Fees," S. G. Perry, D.D.S., New York; "The Application of Medicaments in Pathological Conditions of the Oral Cavity," M. W. Foster, M.D., D.D.S., Baltimore; "The Latest Achievement in Dental Art," R. Ottolengui, D.D.S, New York; Report Committee on Practice, M. L. Rhein, M.D., D.D.S., New York.

H. J. BURKHART, *President*.
CHAS. S. BUTLER, *Secretary*.

DENTAL SOCIETY OF SOUTHWESTERN MICHIGAN.

THE semi-annual meeting of the Dental Society of Southwestern Michigan will be held at Niles, April 14 and 15, 1896, at Hotel Niles. An interesting program has been prepared, and a cordial invitation is extended to the profession in this and other states.

E. I. BACKUS, *Secretary*.

MISSISSIPPI BOARD OF DENTAL EXAMINERS.

THE following were appointed as a Board of Dental Examiners by the Governor of Mississippi on February 15, 1896: Geo. B. Clement, Macon; L. G. Nisbet, Aberdeen; J. B. Askew, Vicksburg; J. H. Magruder, Jackson; D. A Nash, Biloxi.

MISSISSIPPI VALLEY DENTAL ASSOCIATION.

THE fifty-first annual meeting of the Mississippi Valley Dental Association will be held in Ohio Dental College Building, corner Court street and Central avenue, Cincinnati, O., April 15 and 16, 1896.

DR. W. V. B. AMES, *President.*
DR. J. R. CALLAHAN, *Chairman Ex. Com.*

SOUTH CAROLINA STATE DENTAL ASSOCIATION.

THE South Carolina State Dental Association will hold its twenty-sixth annual meeting at Columbia, S. C., on the 12th of May, 1896.

R. ATMAR SMITH, *Recording Secretary.*

◆

EDITORIAL.

"WHEN DOCTORS DISAGREE."

WE publish in this number a paper read by Dr. Talbot before the Academy of Stomatology upon pyorrhea alveolaris. The discussion which it evoked appears elsewhere in the same issue. The avowed intent of the article is to show that the uric-acid theory of the origin of pyorrhea alveolaris is not supported by clinical tests. We were unfortunately unable to be present at the reading of Dr. Talbot's paper, and consequently unable to take part in its discussion, for which reason, and because certain important features of the paper were not discussed, we propose to discuss them here.

Dr. Talbot reports the results of a chemical examination of the concretions upon the roots of a total of two hundred and fifteen teeth, obtained from various sources. Out of the entire number but twelve gave evidence of the presence of uric acid as shown by the murexid test. We dismiss as valueless the reported indications of the presence of uric acid developed from the other tests used, as any chemist knows their elements of inaccuracy.

The fact then remains that of all the two hundred and fifteen cases subjected to chemical test at the instigation of Dr. Talbot, but twelve, or approximately six per cent., definitely showed the presence of uric acid or urates in the concretions. It is to be noted that at least one-fourth of the cases examined had histories indicating uric-acid toxemia.

We have here the result of the second elaborate chemical investigation of concretions found upon roots of teeth the subject of pyorrhea alveolaris; the first one having been published by Dr. G. V. Black in the *Dental Review* of July, 1894.

The results of these two sets of analyses and the deductions drawn therefrom by the authors named are in singular contrast. Reduced to their lowest terms they may be thus stated: Dr. Talbot finds evidences of uric acid in but twelve out of two hundred and fifteen cases, therefore uric acid is not a factor in the causation of pyorrhea alveolaris. Dr. Black, whose analyses included salivary as well as serumal deposits, found evidences of uric acid in nearly all of his fifty-one cases; therefore, because of its almost universal occurrence, he also concludes uric acid is not a factor in the causation of pyorrhea alveolaris.

Our belief in the uric acid theory, if we are to depend alone upon the deductions from these two reports for our guidance, appears to be jeopardized by the conditions which gave rise to the ancient lines expressing the position of believers in a certain theological dogma, viz,

"We're damned if we do, and
We're damned if we don't."

What then is the source of the inharmony in these reports? The strong probability is that the methods of analysis pursued by the experts who did the work for Dr. Talbot were inaccurate. The murexid reaction is easily obtained when we have to deal with considerable amounts of uric acid or its salts. The case is quite different when minute traces of these compounds are to be detected. The directions usually given in the books for detecting uric acid by the murexid test are as a rule faulty when applied to the material under consideration. This is especially true as to the method of applying the ammonia after the suspected substance has been treated with nitric acid. An excess of ammonia readily destroys the color effect. So slight is the amount of ammonia required to produce the purpurate that the color may in many cases be developed from the ammonia of the breath by simply breathing against the oxidized substance on the porcelain or glass support. No detailed account is given by Dr. Talbot, as was done by Dr. Black, of the technique employed in making the tests. In the absence of this, and in view of the fact that by Dr. Black's tests the urates were discovered in similar cases, we must regard the record of tests furnished by Dr. Talbot as faulty if not practically worthless. No reflection is here intended either upon the skill of the chemists who made the tests, or of Dr. Talbot's honesty of purpose in reporting them. We simply desire to point out a probable source of error which the circumstances seem to justify a belief in.

As to the significance of the occurrence of uric acid in these deposits, we have expressed an opinion at length in these pages on other occasions, and especially in the issue for September, 1894, in review of Dr. Black's paper on the subject. This matter it is unnecessary to go over again.

Both Dr. Talbot's paper and the discussion thereon, as well as the majority of the opinions expressed by recent writers on the subject, leave the etiology of pyorrhea alveolaris disposed of in one of three ways :

First, it is purely a local disorder in its origin ;

Second, it is purely of constitutional origin with a local expression ;

Third, it is both of the foregoing.

Is it not true, as has been clearly expressed by Dr. Peirce and others, that pyorrhea alveolaris is a disorder having a variety of causes? Nobody doubts that certain forms of pyorrhea are distinctly local in their origin, and nearly all are willing to admit that certain other cases have a constitutional relationship. In fact, the constitutional factor is very generally admitted. Dr. Talbot recognizes syphilis, mercurial salivation, potash iodid, loss of vitality, locomotor ataxia, paretic dementia, and the menstrual nisus as constitutional causes of pyorrhea. But because he has been unable to find urates in the concretions upon the roots of pyorrheal teeth, even from uric-acid cases, he argues that uric-acid toxemia is not an etiological factor in the disease ; or, again, because so many have pyorrhea and so few uric-acid poisoning, the latter is not responsible for the former. As to the first deduction, we believe, as before stated, that the failure to detect uric acid was due to imperfect methods of chemical analysis. As to the second, we might as well argue that because men have pyorrhea as frequently as women, the "menstrual nisus" cannot be considered an etiological factor in pyorrhea.

Another vulnerable point in the paper is set forth in the following quotation :

"If this theory moreover were correct, the deposits, which are in the capillaries in a liquid state, surrounding the teeth, would attack all the teeth at the same time and deposit equally, or nearly so, around the root of each tooth, which never occurs.

"Certainly uric acid cannot produce that peculiar form of pyorrhea in which no deposits are found and which is so frequently observed."

Therein the author betrays not only an imperfect knowledge of the pathological expressions of uric-acid toxemia, but a faulty observation with respect to its pyorrheal manifestation.

While we are unable to understand how a deposit of any sort can exist "in the capillaries in a liquid state," we see no reason why the uratic disorder should not attack the ligament of a single dento-alveolar articulation, upon the same principle that it frequently attacks the first metatarso-phalangeal joint of the foot to the exclusion of other joints of the body.

The statement that a general invasion of the disease, including all of the teeth, "never occurs" is an error of fact, as such cases frequently occur and have probably been observed by most practitioners. As a matter of fact, such a case is reported by Dr. Wm. H. Trueman in the discussion of Dr. Talbot's paper in this issue.

That "uric acid cannot produce the peculiar form of pyorrhea in which no deposits are found" is a statement which, if it is intended to be an expression of the author's belief, shows an imperfect concept of the modus by which uric acid is stated by expert pathologists to affect tissue metamorphosis. If a molecular necrosis may occur in certain tissues of the body from excess of uric acid in the blood, why should so vulnerable a tissue as the pericemental membrane be exempt?

On page 316, beginning with the second paragraph and ending with the first paragraph on page 317, Dr. Talbot gives as clear a description as needs be of the nature of the pathological process caused by uric-acid toxemia upon the tissues under consideration. He cheerfully admits the necessity for a constitutional factor in explaining its etiology, but notwithstanding the well-known causal relation between uric-acid toxemia and the atheromatous degeneration to which he alludes, and also the widely prevalent nature of uricacidemia, he lugs in by the ears, as it were, a group of constitutional disorders, any of which or all of them collectively bear but an insignificant numerical relation to the prevalent number of pyorrheal cases.

The uric-acid factor in certain pyorrheal cases may be so obscure as to be doubted, but as in the analogous case where in the diagnosis of an obscure lesion syphilis may be suspected, in the absence of a history of specific infection, entire reliance is placed upon the therapeutic test, and all doubts are resolved by the result of it. So, in these cases, if an intelligently applied anti-gout regimen and therapeusis effects a cure of the pyorrhea, we are equally justified, all things considered, in regarding the uric-acid element as a factor in its causation.

The results of an anti-uratic treatment in the class of cases considered by Dr. Talbot in his paper leave no ground for doubt as to the soundness of the reasoning leading to its use. We would earnestly recommend to the opponents of the uric-acid theory the careful study of the pathology of gout and uric-acid toxemia, and, having mastered this and its intelligent therapeusis, to apply it in the constitutional treatment of pyorrhea.

The results will repay the effort.

THE LOW BRIDGE PATENT CASE.

WE are pleased to announce, upon information furnished by Dr. J. N. Crouse as we go to press, that the case involving the validity of the Low Bridge patent, which was argued before Judge Wheeler January 14–17 in the United States Circuit Court for the Eastern District of New York, has been decided in favor of the defendant, who technically was Allen G. Bennett, D.D.S., but in reality was the whole dental profession through the Dental Protective Association of the United States.

EXCESS OF MATTER.

SIXTEEN additional pages of reading-matter are furnished with this number of the DENTAL COSMOS; notwithstanding which we are compelled to omit reports of several societies, dental college commencements, book notices, etc., already in type and intended for this issue.

OBITUARY.

DR. JOHN DE HAVEN WHITE.

DIED, in Philadelphia, Pa., December 25, 1895, of heart-disease, JOHN DE HAVEN WHITE, M.D., D.D.S., in the eighty-first year of his age.

Dr. White's death occurred at the Masonic Home on North Broad street, Philadelphia, of which institution he had been an inmate for several years. He was born at Lancaster, Pa., on the 19th of August, 1815, and his early years were spent on a farm.

After attaining his majority, Dr. White commenced the study of medicine in Jefferson Medical College, Philadelphia, and was subsequently granted the diploma of M.D. from that institution. He early turned his attention to the special study of dentistry, and, under the preceptorship of Dr. Michael N. Blankman, who was in practice on Walnut street above Tenth, he soon fitted himself for practice, which he commenced at Middletown, Pa., where he remained only a few months. Returning to Philadelphia about 1837, he entered upon a successful professional career which made him a prominent figure in the ranks of dentistry for a long time, both in its literature and in its practice.

In 1845 the Pennsylvania Association of Dental Surgeons was originated, largely through the instrumentality of Dr. White. This was about the fourth regularly organized dental society in the United States, and its important work in the progress of dentistry has extended over a long period of time. Dr. White was some time its president.

The Philadelphia College of Dental Surgery (which was chartered in 1850) began its first session in November, 1852, with a faculty many of whose names became subsequently famous in dentistry in Philadelphia and elsewhere. Dr. White was its professor of anatomy and physiology in 1852, and in 1854 he was made professor of operative dental surgery and special dental physiology, which chair he continued to hold until that college ceased to exist in 1856.

But it was perhaps in the field of the literature of the profession that Dr. White made himself most widely known. In October, 1853, he became one of the editors of *The Dental News Letter*, associated with Dr. J. R. McCurdy, and this relation continued until July, 1859, when that journal was discontinued, and was succeeded by the Dental Cosmos, in August of that year, with Dr. White as editor in chief. Associated with him were the late Dr. J. H. McQuillen and Dr. George J. Ziegler. Dr. White continued in the editorship until 1865, when he retired. The pages of these journals during that formative period of modern dentistry show how prolific was his pen and how constant his industry in the interests of his profession.

Dr. White was honored by many institutions of learning. He was an A.M. of the University of St. Louis and Washington College, and received the honorary degree of D.D.S. from several dental institutions, as well as honors from foreign universities.

During his long and extensive practice in the city of his adoption, he numbered among his patients many of its most prominent citizens. He was strong both mentally and physically, which enabled him to achieve in his day and generation a degree of success which was second to none. He never lost his interest in the literature of his profession, and indeed in general literature. Many years ago he published a volume of poems, which was quite extensively circulated. His tastes were broad and catholic. Having been retired from active practice for several years, his death at this time revives the name of one who was among the advance guard in the great developments of modern dentistry. The necrology of the last decade embraces the names of many who were prominent in his day, and shows how rapidly they are passing away.

Dr. White was married in 1836 to Mary Elizabeth Meredith, of Philadelphia. They left three children, Drs. Horace M. and John De Haven White, Jr., practicing dentists, and Mrs. Sarah De Haven Van Lott. He was buried with Masonic rites.

DR. WILLIAM H. DWINELLE.

William H. Dwinelle, A.M., M.D., D.D.S., who died February 13, 1896, at the family homestead in Cazenovia, N. Y., was a man of extraordinary attainments and original power, and one of the most renowned and influential dental surgeons of his time. Although a graduate in medicine, and early fascinated by surgery, it was dentistry that became his chosen field of work. In this specialty he was recognized as an authority on both sides of the Atlantic. Together with others he helped to raise American dentistry to the place it now occupies. Over a generation ago he performed operations on the jaw for removal and resection similar to those that are to-day the pride and glory of modern general surgery. The numerous discoveries made by him include many of the inventions used in dentistry. Accounts of these appeared in various scientific journals, illustrated by wood-cuts of the author's own engraving. Dr. Dwinelle refused to have anything patented, saying he considered it illiberal and degrading to make a traffic of what should be free to all. Instruments needed in the early days, and never before manufactured, he made for himself.

As co-worker with Dr. Chapin A. Harris, Dr. Dwinelle was instrumental in establishing the first dental college in the world (the Baltimore College of Dental Surgery), thus removing dentistry from the hands of charlatans and raising it to the level of a dignified profession. He was also associate editor of the first dental journal ever published,—the *American Journal of Dental Science*. Always a clever writer, an easy conversationalist, and a brilliant after-dinner speaker, he proved a popular lecturer and demonstrator in the leading dental colleges.

For over fifty years a prominent and public-spirited citizen of New York City, Dr. Dwinelle witnessed the beginning of organizations that are now permanent sources of power and progress, and often aided their inception and material prosperity. For many years he was a member of the Union League Club, the New York Historical Society, the St. Nicholas Society, the New York Jockey Club, the National Academy of Design, of several foreign associations, of the New York Country Medical Society, the First District Dental Society, and of the New York Odontological Society, of which he was formerly president. A memorable dinner given by the dental profession celebrated his fiftieth anniversary of active practice. Most of the famous men of the time were his friends. His own warm and generous nature prompted the quick recognition of merit in others: Witness his able defence of Morton's claims to priority in the discovery of the application of ether for general anesthesia in surgical operations, published in 1849, at a time when the medical profession were divided in opinion, and much doubt and bitter discussion prevailed. Reprints were freely circulated throughout the United States, and also in Europe. About 1850 began to appear Dr. Dwinelle's papers on the microscope, its use, workings, and value to clinical medicine and dentistry. In an early monograph, the late Dr. Marion Sims makes the statement that it was his friend Dwinelle's enthusiasm which first led him to become acquainted with the wonders and revelations of the microscope. Dr. Dwinelle's interest in microscopy remained the chief consolation of his later years. An improved process of printing at one time absorbed much of his attention, resulting in personal financial loss, though a source of wealth to the company that appropriated it.

Dr. Dwinelle's professional work was eminently artistic and finished. He had a delicate esthetic sense, and possessed considerable talent as a draftsman, engraver, sculptor, and designer. The late W. W. Story used to say of him that a great sculptor had been lost through his choice of a profession. Books and pictures were his delight. By force of genius and prodigious industry he amassed a large fortune, that later, when disease overtook him, was dispersed in hazardous speculations. The twilight of declining days was passed quietly in the home of his childhood.—B.

The New York Odontological Society, at its meeting on March 17, passed resolutions of respect to the memory of Dr. Dwinelle, who was formerly its president. These resolutions are appropriate and excellent, and are only omitted from our pages for want of space We quote the following sentence: "Before the bar he would have been a great advocate; in the medical profession he would have been a great physician or a great surgeon. He chose to be a great dentist."—Ed.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

The abbreviations of titles used are those common to bibliographical work, and will, it is presumed, be readily comprehended by any one familiar with dental or scientific publications. Any explanation will be gladly furnished by the compiler. A star (*) indicates a Thesis.

Gorgas (Ferdinand J. S.) Dental medicine: a manual of dental materia medica and therapeutics. 5. ed., revised and enlarged. Philadelphia, 1895, P. Blakiston, Son & Co., 580 p. 8°.

Harris (Chapin A.) The principles and practice of dentistry, including anatomy, physiology, therapeutics, dental surgery, and mechanism. 13 ed., revised and edited by Ferdinand J. S. Gorgas. Philadelphia, 1896, P. Blakiston, Son & Co., xxii, 23–1180 p. 8°.

Holländer (L. H.) Das Füllen der Zähne: Ein Leitfaden für Anfänger und Geübtere. 3. neu bearbeitete Aufl. Leipzig, 1896, A. Felix, xiii, 182 p. 8°.

Sewill (Henry.) Diagnosis of toothache and neuralgia of dental origin. Bristol, 1895, J. Wright & Co. 8°.

Wöhnlich (Wilhelm.) * Ueber das Empyema antri Highmori. Jena, 1895, H. Pohle, 68 p. 8°.

Achard (W. C.) Ancient and modern hypnotism. Am. J. Dent. Sc., Balt., 1896, 3. s., xxix, 433-444.—**Ambler** (C. P.) Empyema of the maxillary sinus. Cleveland J. M., 1896, i, 48-53.—**Amoedo** (O.) Four consolidated dental implantations. Dental Cosmos, Phila., 1896, xxxviii, 130-132.—**Bauer** (S.) Compositions-oder Gipsabdruck? Vrtljschr. f. Zahnheilk., Wien, 1895, xi, 10–17.—**Bosscha** (H. P.) De gevaren der broomaethyl-narcose. Med. Weekbl., Amst., 1895-6, ii, 301.—**Bleichsteiner** (A.) Dachziegelförmige Deckung einer Stellungsanomalie mit Unterzahl der Zähne des Unterkiefers. Vrtljschr. f. Zahnheilk., Wien, 1895, xi, 8-10. ——— Osteoma maxillæ inferioris sinistræ; resectio; prothesis. *Ibid:* 5-8.—**Boylan** (J. E.) Chronic herpes of the fauces. Internat. M. Mag., Phila., 1895-6, iv, 915-919.—**Briddon** (C. K.) Extirpation of carcinoma of tongue. Ann. Surg., Phila., 1896, xxiii, 193.—**Briggs** (C. S.) Excision of right half of inferior maxillary for myeloid sarcoma. Nashville J. M. & S., 1896, lxxix, 19. ——— Periosteal sarcoma of lower jaw; excision. *Ibid:* 16–19.—**Brophy** (R. C.) Necrosis of the maxilla. Chicago M. Times, 1895-6, xxxix, 47.—**Brown** (G. C.) Dental examining boards in the United States and preliminary education. Dental Reg., Cincin., 1896, l, 59-67. ——— *Also:* Internat. Dent. J., N. Y. & Phila., 1896, xvii, 87-94.—**Browne** (L.) Chronic hypertrophy and varix of the lingual tonsils. Liverpool M.-Chir. Rev., 1896, xvi, 13–26. ——— The lingual tonsil. Med. Mag., Lond., 1896, v, 35-43.—**Buxton** (D. W.) The nature of anæsthesia. Lancet, Lond., 1896, i, 279–282.—**Carroll** (Robert A.) [1821–95.] (Obituary.) Dental Cosmos, Phila., 1896, xxxviii, 180.—**Chervin**. Le frein de la langue. Bull. Soc. de méd. de Par. (1894), 1895, 4. s., ii, 89–100. ——— Orthophonie méthodique consécutive aux staphylorrhaphies. Cong. de chir. Proc. verb. 1894, Par., 1895, viii, 382–384.—**Colyer** (J. F.) Two cases of gemination and their relation to the so-called "odontome coronaire." J. Brit. Dent. Ass., Lond., 1896, xvii, 35–37. ——— An unusual radicular odontome. *Ibid:* 38.—**Cool** (W. G.) Dentistry in Spanish America. Ohio Dent. J., Toledo, 1896, xvi, 98–100.—**Darling** (C. G.) Tumors of the mouth. Ohio Dent. J., Toledo, 1896, xvi, 79–83.—**Death under** pental. J. Brit. Dent. Ass., Lond., 1896, xvii, 51.—**Died under gas.** [Case.] Am. J. Dent. Sc., Balt., 1896, 3. s., xxix, 464–466.—**Dietlein** (W.) Neue Beiträge zum Zahnwechsel und verwandten Fragen. Vrtljschr. f. Zahnheilk., Wien, 1895, xi, 65; 159.—**Discussion** of questions submitted by the American Dental Association. Pacific Dent. J., Tacoma, 1896, vi, 1–14.—**Downie** (W.) Aprosexia, convulsions and adenitis, dependent on pathological changes in the faucial, lingual and pharyngeal tonsils. Glasgow M. J., 1896, xlv, 19–28.—**Dozy** (F.) De broomaethyl-narcose toegepast in de tandheelkunde. Med. Weekbl., Amst., 1895-6, ii, 288–292.—**Dubois** (N.) Dissertation sur les dents artificiels. Progrès dent., Par., 1895, xxii, 263; 390; 321; 353.—**Dunogier**. Abcès alvéolo-dentaires et actinomycose. Mém. et bull. Soc. de méd. et chir. de Bordeaux (1894), 1895, 590–593. ——— Ostéo-périostite du maxillaire supérieur droit; abcès persistant de la voûte palatine. *Ibid:* 137-141.—**Eames** (G. T.) The relation of adenoid vegetations to irregularities of the teeth and associated parts. J. Am. M. Ass., Chicago, 1896, xxvi, 323-326.—**Escat** (E.) Amygdalite linguale phlegmoneuse. Rev. hebd. de laryngol. [etc.], Par., 1896, xvi, 129-133.—**Escher.** Pulpabehandlung und Wurzelfüllungen. Deutsche Monatschr. f. Zahnh., Leipz., 1896, xiv, 36-42.—**Farrar** (J. N.) Correction of a double difficult case of irregularities of the teeth at thirty years of age. Ohio Dent. J., Toledo, 1896, xvi, 57-66.—**Fawcett** (E.) On a possible cause of paroxysmal neuralgia of the fifth nerve (inferior maxillary division). Clin. sketches, Lond., 1896, iii, 9-11.—**Fletcher** (M. H.) An interesting case. Ohio Dent. J., Toledo, 1896, xvi, 87.—**Frèche.** Lichen plan isolé de la bouche. Mém. et bull. Soc. de méd. et chir. de Bordeaux (1894), 1895, 333-343.—**Gevaert** (C.) Corps étranger de pharynx et de l'œsophage; leur extraction par la bouche. Belgique méd., Gand-Haarlem, 1895, ii, 225-234.—**Gillett** (H. W.) Cataphoresis for obtunding sensitive dentine. Dental Cosmos, Phila., 1896. xxxviii, 132-136. ——— Electrical osmosis for the treatment of living dentine. Internat. Dent. J., N. Y. & Phila., 1896, xvii, 65-83.—**Gougenheim & Ripault** (H.) Contribution à l'étude des tumeurs bénignes du voile du palais. Ann. d. mal. de l'oreille, du larynx [etc.], Par., 1896, xxii, 1-8.—**Grant** (G. F.) Hypnotism: its value to the dental specialist. Internat. Dent. J., N. Y. & Phila., 1896, xvii, 83-87. [Discussion], 96-105.—**Gutmann** (A.) Ueber die Bedeutung des Pemphigus für die Zahnheilkunde. Deutsche Monatschr. f. Zahnh., Leipz., 1896, xiv, 15-25.—**Halban** (J.) Zur Physiologie der Zungennerven. Wien. Klin. Rundschau, 1896, x, 51-53.—**Hamecher** (H.) Vereinfachte Kronen- und Brückenarbeiten, Vrtljschr. f. Zahnheilk., Wien, 1895, xi, 116-158.—**Heath** (C.) A case of osteo-sarcoma of both upper jaws: removal. Brit. J. Dent Sc., Lond., 1896, xxxix, 49-55. ——— A case of sarcomatous tumor of the upper jaws. Internat. Clin., Phila., 1896, 5. s., iv, 196-204, 2 pl.—**Herz-Fränkl** (W.) & **Schenck** (F.) Erläuterungen über die Wirkung der Arsenpaste auf die Zahnpulpa. Vrtljschr. f. Zahnheilk., Wien, 1895, xi, 50-60.—**Hewitt** (F.) Nitrous oxid and oxygen. Dental Cosmos, Phila., 1896, xxxviii, 136.—**Hind** (A. E.) Hæmorrhages after tooth extraction arrested instantly by ethyl chloride. Lancet, Lond., 1896, i, 230.—**Hodgen** (Isaac Newton.) [1814-95.] (Obituary.) Dental Cosmos, Phila., 1896, xxxviii, 180.—**Holford** (W. S.) A case of epulis. J. Brit. Dent. Ass., Lond., 1896, xvii, 43.—**Hunter** (J.) New method of illumination for photo-micrography. *Ibid:* 16-26, 2 pl.—**Hutchinson** (J.) Relapsing sore tongue. Med. Press & Circ., Lond., 1896, n. s., lxi, 76.—**Kielhauser** (H.) Das nasale Empyem des Antrum Highmori und dessen operative Behandlung. Vrtljschr. f. Zahnheilk., Wien, 1895, xi, 61-65.—**Kirk** (E. C.) Furred tongue. Am. J. Dent. Sc., Balt., 1896, 3. s., xxix, 449-451.—**Kratzer** (C. V.) Dentinal dehydration. Dental Cosmos, Phila., 1896, xxxviii, 137-148.—**Lane** (L. C.) Epithelioma of the tongue and its treatment. Tr. Pan Am. M. Cong. 1893, Wash., 1895, pt. 1, 553-563.—**Latrille** (G.) Le traitement de l'hypertrophie chronique des amygdales palatines. Poitou méd., Poitiers, 1896, x, 1-6.—**Lopes Vieira.** A queda prematura dos dentes ou periodontite expulsiva. Coimbra med., 1896, xvi, 35-38.—**Lund** (F. B.) Recent advances in the methods of local anæsthesia. Boston M. & S. J., 1896, cxxxiv, 134-137. [Discussion], 144.—**McBurney** (C.) Non-recurrence of cancer of tonsil three years after operation. Med. Rec., N. Y., 1896, xlix, 204.—**McGuire** (H.) A modification of Whitehead's operation for the removal of the tongue. Internat. Clin., Phila., 1896, 5. s., iv, 220-222.—**M'Kennan** (H.) Foreign body in tongue. Med. Age, Detroit, 1896, xiv, 44.—**Martel** (L.) Sur une variété rare de lipome: lipome de la base de la langue. Rev. de chir., Par., 1896, xvi, 52-55.—**Matheson** (L.) A few practical points. Brit. J. Dent. Sc., Lond., 1896, xxxix, 97-110.—**Mills** (W. A.) Arch or span filling. Dental Cosmos, Phila., 1896, xxxviii, 127-129.—**Mixter** (S. J.) Tumors of the parotid appearing in the faucial region. Boston M. & S. J., 1896, cxxxiv, 137.—**Montagnon.** Calcul salivaire du canal de Wharton. Gaz. d. hôp. de Toulouse, 1896, x, 10.—**Moty** (F.) La carie dentaire dans l'armée. Arch. de méd. et pharm. mil., Par., 1896, xxvii, 81-99.—**Newborn** (J. L.) Cocaine. Am. J. Dent. Sc., Balt., 1896, 3. s., xxix, 444-446.—**Nieuwe** (Het) tandheelkundig instituut der Rijksuniversiteit te Utrecht. Nederl. Tandheelk. Maandbl., Roermond, 1895, ii, 139.—**Nux** (L.) Prothèse immédiate du maxillaire inférieur. Rev. odontol., Par., 1896, xxxi, 5-14.—**O'Reilly** (H.) Uvulotomy. Am. Pract. & News, Louisville, 1896, xxi, 51-53.—**Pare** (J. W.) Photo-micrography. Brit. J. Dent. Sc., Lond., 1896, xxxix, 63-71.—**Parvin** (T.) Schleich's local anæsthesia in surgery. Med. & Surg. Reporter, Phila., 1896, lxxiv, 161-169.—**Patwardhan** (D. A.) Notes of a case of fibro-sarcoma of the superior maxilla. Indian M.-Chir. Rev., Bombay, 1895, iii, 715-717.—**Pedley** (F. N.) Case of mandibular fracture. J. Brit. Dent. Ass., Lond., 1896, xvii, 49.—**Pettyjohn** (E. S.) Transplantation of teeth after complete traumatic dislocation. Chicago Clin. Rev., 1895-6, v, 235.—**Piéchaud.** Urano-staphylorrhaphie. Mém. et bull. Soc. de méd. et chir. de Bordeaux (1894), 1895, 131-133.—**Proctor** (D. E.) Peritonsillar abscess, with a case. Med. Progress, Louisville, 1896, xii, 1-3.—**Rafin.** Névralgie du dentaire inférieur avec irradiations aus sus et sous-orbitaires; insuccès de la névrotomie par la méthode de Michel; résection du dentaire inférieur; guérison se maintenant huit mois après. Cong. de chir. Proc.-verb. 1894, Par., 1895, viii, 190.—**Raugé** (P.) Sur la chirurgie du sinus maxillaire et ses progrès depuis dix ans. *Ibid :* 405-413.—**Rochet.** Ostéotomie de la branche montante avec interposition musculaire dans l'ankylose temporo-maxillaire unilatérale. *Ibid :* 485-487.—**Rogers** (W. B.) Epulis. Memphis M. Month., 1896, xvi, 12.—**Röse** (C.) Der Einfluss der Bodenbeschaffenheit auf den Bau der menschlichen Zähne. Deutsche Monatschr. f. Zahnh., Leipz., 1896, xiv, 26-33. ——— Ueberreste einer vorzeitigen prälactealen und einer vierten Zahnreihe beim Menschen. Vrtljschr. f. Zahnheilk., Wien, 1895, xi, 45-50.—**Rose** (H.) Continuous gum facings. J. Brit. Dent. Ass., Lond., 1896, xvii, 40-43.—**Roughton** (E. W.) Tumours of the maxilla. Brit. J. Dent. Sc., Lond., 1896, xxxix, 56-62.—**Scheff** (J.) Argyria dentium. Vrtljschr. f. Zahnheilk., Wien, 1895, xi, 1-5, 1 pl.—**Schild** (M.) Periostitis and Luxat. incompl. durch Separation herbeigeführt. *Ibid:* 113-116.—**Schmid** (H.) Ueber einige neuere Zahnextractionsinstrumente nebst Bemerkungen über schwierige Zahnextractionen. Prag. med. Wchnschr., 1896, xxi, 22.—**Schmidt** (M. B.) Ueber die localen Amyloidtumoren der Zunge. Arch. f. path. Anat., etc., Berl., 1896, cliii, 369-399, 1 pl.—**Seitz** (G.) Beitrag zur Casuistik der Immediat-Prothesen. Deutsche Monatschr. f. Zahnh., Leipz., 1896, xiv, 1-14.—**Shears** (G. F.) Excision of more than one-half of the inferior maxilla, with a mechanical device for preventing deformity. Clinique, Chicago, 1896, xvii, 1-7.—**Spire** (J.) Du lupus de la langue. Arch. clin. de Bordeaux, 1895, iv, 557-571. —**Stark** (E.) Dental education in Holland. Brit. J. Dent. Sc., Lond., 1896, xxxix, 84-86.—**Storey** (J. C.) Some thoughts touching excess of mineral or calcareous matter in the system. Texas Dent. J., 1896, xiv, 6-11.—**Straight** (H. S.) Excision of the fourth tonsil. Cleveland J. M., 1896, i, 31. ——— Hypertrophy of the lingual tonsil, with report of a case. *Ibid :* 59.—**Tompkins** (E.) Hypertrophy of the lingual tonsil, with report of cases. Virginia M. Month., Richmond, 1895-6, xxii, 906-913.—**Trenité** (A. N. N.) Neuralgia rami ii n. trigemini met operatie. Med. Weekbl., Amst., 1895-6, ii, 303-305.—**Vallas.** Sur la pharyngotomie transhyoïdienne. Lyon méd., 1896, lxxxi, 160-162.—**Wadsworth** (E. Clifford.) [1838-95.] (Obituary.) Dental Cosmos, Phila., 1896, xxxviii, 179. —**Walsh** (J. F.) Stretching of the lingual branch of the fifth nerve for the relief of neuralgia of the tongue. Ann. Surg., Phila., 1896, xxiii, 48-53.—**War** (The) on the dental colleges. Internat. Dent. J., N. Y. & Phila., 1896, xvii, 122-126.—**Ward** (E. B.) Ethyl chloride as a local anæsthetic. Internat. J. Surg., N. Y., 1896, ix, 10.—**Weil.** Prof. Millers onderzoekingen over tandaanslag, bizonberlijk wat betreft den groenen en metaalachtigen aanslag. Nederl. Tandheelk. Maandbl., Roermond, 1895, ii, 110-113.—**White** (G.) Capping pulps. Ohio Dent. J., Toledo, 1896, xvi, 68-71.—**White** (John De Haven.) [1815-95.] (Obituary.) Internat. Dent. J., N. Y. & Phila., 1896, xvii, 129.—**White** (J. W.) & **Wood** (A. C.) A case of excision of both upper jaws, with some remarks on the tumors affecting these bones and their operative treatment. Univ. M. Mag., Phila., 1895-6, viii, 321-334.—**Whitslar** (W. H.) The diagnosis of lesions of the heart previous to administering anæsthetics. Ohio Dent. J., Toledo, 1896, xvi, 73-77.—**Wright** (W. H.) The care of children's teeth. Ohio Dent. J., Toledo, 1896, xvi, 84-86.

LIST OF UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING FEBRUARY, 1896.

February 4.—No. 553,992, to C. H. Land. Furnace.
" " No. 553,993, to C. H. Land. Furnace.
" " No. 554,032, to H. C. Register. Hand-piece.
" *18.*—No. 554,740, to Joseph Spyer. Adhesive plate.
" " No. 554,844, to S. A. Stienbarger. Dental forceps.
" " No. 555,035, to S. H. Brooks. Dental engine.
" " No. 25,170, to Mortimer Hyman. Design for tooth-brush handle.
" *25.*—No. 555,139, to Jens Weile. Tooth-cleaning implement.
" " No. 555,158, to J. F. X. Hamer. Dental plate.
" " No. 555,300, to A. W. Browne. Metallic vessel for compressed gases.

THE

DENTAL COSMOS.

VOL. XXXVIII. PHILADELPHIA, MAY, 1896. No. 5.

ORIGINAL COMMUNICATIONS.

THE NEEDS OF OUR PROFESSION; HOW CAN THEY BEST BE MET?

BY DR. CHAS. F. ALLAN, NEWBURGH, N. Y.

(Read before the Second District Dental Society, Brooklyn, N. Y., February 10, 1896.)

SOME months ago, when I was approached by the chairman of your Executive Committee with a view to furnishing a paper to be read before your honorable body, for your possible entertainment and instruction, I did not want to say no, and I was hardly prepared to say yes. This, as I look at it, was a great confession of weakness and inability. Knowing the serious difficulties often besetting the way of the officers of a society who are earnest in their desire to make their society meetings valuable, I wanted to respond "yes" cordially. I should have been prepared with some new ideas in practice, or with the solution of some old difficulties, something that really would have instructed and of course entertained. This need not necessarily have meant an essay or an elaborate paper; and as I look around and see some of the older members of the society before me, I feel that I am after all but one of a class, and that I have the right to use the plural and say that *we* should be prepared more often and more fully than we are to respond to the calls of our societies. As the result of our many years of practice, we should have the will and the ability to make easier the toil and lighter the pathway of those who are following in our footsteps. We received much and have given back but little, and those of you who are my contemporaries, for over a quarter of a century seeing daily the wants of the profession, must also plead with me, *Mea culpa.*

The demand for original investigation is very great, indeed cannot be overestimated, and the men to do it, if practical results are to follow, must be those of us in active practice. It is only they who know to the fullest extent the needs of the profession, it is only they who can prove by the most intelligent tests whether these needs have been met. The busiest men in our profession to-day are men with the largest practices, and it is a Miller, a Black, or an Andrews, who does the work that most of us should have helped in, the work all of us have profited by, and which has made of us a profession. How few they are in number!

Thinking in this wise, it has occurred to me that the seeds of thought I have thus thrown out might possibly find lodgment in fertile soil among the younger members before me; and that if I gave direction to their efforts by suggesting but a few of our many needs, they might bring forth good fruit.

I will only scratch this field; the worlds of knowledge that we don't know are quite beyond the very finite capacity of your essayist; but if you will excuse the Hibernianism, to know what we don't know, even to a limited extent, can certainly be made a commencement of knowledge.

Following up this line of thought, there is probably not a dentist before me who will not place in the van of our great army of needs the want of a good and reasonably general obtundent for sensitive dentine. We have obtundents galore, indeed almost by the hundred, but are there any of them that fill the bill? Is there any one of them that can be depended on for the majority of our average cases, easy of application, non-toxic, and prompt in effect? I have never met it, if there is. The pharmacopœia has many remedies of the greatest value for this purpose, and compounds of these remedies are copyrighted by the score, and their virtues are often extolled, unwisely and improperly I think, in advertisements of our professional journals; but as far as I know none of them meet our wants. This phase of our subject, though in many ways the most important, I will not dilate on only because it is the one want that is continually before us, which we all appreciate, and which consequently does not need as much attention called to it. The ideal obtundent is not as yet in sight, and it is likely that none of us will ever see it. The phases of conditions to be acted upon are so ever-varying and numerous, so affected by personal idiosyncrasies, that it does not seem likely that any one drug or any one treatment will ever be found to meet all of these varying conditions. All the same, it is an *ultima thule* to be worked for and sought after, and whenever even but one condition is met a great advance has been accomplished.

A need of the profession which is almost as crying and urgent as the one just mentioned, and which is not as generally recognized, is that of a prophylactic for the prevention of decay. I refer to some drug that will take the place of nitrate of silver.

For almost as long a time as the profession has had colleges and a periodical literature, the prophylactic qualities of *argenti nitras* have to some extent been recognized, but only in an inconsequential way. No one told us and practically demonstrated to us that certain phases of decay, particularly in children's teeth, could be controlled or prevented by nitrate of silver; no one suggested that it could and should be used as a part of our regular practice until Dr. Stebbins, in the summer of 1891, in a paper read before the Connecticut Valley Dental Society, made the above assertions and afterward demonstrated their truth.

What others had vaguely suggested might be good practice, he demonstrated was good practice; and, what is more to the point, he did not hide his light under a bushel, but he put it where it would illuminate the dental world. He published the results of his investigations and made us greatly his debtors. In our generation, no practice has been newly advocated that to my mind can be made as productive of the salvation of teeth from decay as this use of nitrate of silver, and I am afraid it has only come into general use inversely in proportion to its merits. It does blacken the teeth, to be sure; but of what consequence is that when it is used in the baby molars of young children or on the lingual or palatal margins of the first or second molars? In those distressing cases of rapid decay, generally occurring in teeth of very soft structure, where a whitish line of imperfectly calcified enamel is followed up at an early date with a line of incipient decay, almost girdling the tooth, there our argenti nitras works like a charm and is almost as specific.

In exaggerated cases of this kind we are sometimes almost powerless without its help. Frequently from the very nature of the case we cannot be thorough. Cutting into this cheese-like structure there is no good place to stop, no sound tooth-material to work up to, short of such a severe and tedious operation as is, in many cases, impossible.

This is but one, however, of very many occasions in which nitrate of silver can be used to advantage. As a preservative of teeth used as abutments for bridge-work it is very valuable, and as an obtunder of sensitive surfaces it can often be used to the greatest advantage.

Now, the application I would make of this eulogium on the practical benefits to be obtained from the use of argenti nitras is this: We want some medicine or material that, having the preservative powers of the silver salt, will not discolor the tooth; in other words, we want a material with the preservative and innocent qualities of nitrate of silver that can be used on the anterior as well as the posterior teeth, the permanent teeth as well as the temporary. This is the one great want of our materia medica which seems to me within our possible reach, and I cannot call your attention to it too urgently. When we think of the great strides that have been made in therapeutics the past few years, especially in the direction of local anesthetics and also in the way of antiseptics and germicides, who is there among us who has not great expectations that this want of ours will be met also? Experiment, agitate, and this want will be satisfied as most other great wants have been in the past.

But the bent of all dentists is not toward therapeutics, and each of us will accomplish better results by directing our efforts toward that line of work which our inclinations most favor. That which we love to do we are apt to do well, and for those of us who delight mostly in the mechanics of our profession, there are many wants which all of us can help to supply.

I wish, however, to make this paper not only practical, but short, so I can only hint at several of the salient needs in this direction as they occur to me.

First and foremost in the line of my personal wants is that of better and more varied forms of separators. Those that are sold to us by the instrument-makers and known to us as the Perry separators are very valuable aids, and reflect the greatest credit on the inventor whose name they bear. They have been of infinite assistance, but they need to be improved and added to. The bows of the separators should be so shaped as to rest on the teeth to be separated, not on the adjoining teeth. Made in this way, the number of cases in which they could be used would be greatly increased ; they could be so shaped as to be less in the way and less apt to catch in the corner of the mouth when used in the bicuspid and bicuspid-molar spaces. We need them in some cases with closer jaws for the anterior teeth ; we need them of better shape for the cuspid-bicuspid space, and of a longer reach, for those of our patients who have very long bicuspids and molars. In many cases with mouths involving this last-mentioned condition, the separators will only catch near to the morsal surfaces of the teeth, and are of *very* little help.

We need also a better quality of steel for our instruments. In what direction we are to look for this improvement I certainly do not know.

Many years ago the old firm of Johnston Brothers made me some chisels of chrome steel, and they had a harder, better cutting-edge than any instruments I have ever had ; but there were serious difficulties in the practical commercial management of this steel, and the chrome steel works have long since abandoned the making of steel for tool purposes.

A better-shaped forceps for the extraction of the superior third molars is also much to be desired,—one with smaller beaks and the beaks set at a sharper angle, the handle and beaks so joined and shaped that there will be no difficulty in giving the backward and sideling motion that allows of the tooth slipping out of its socket with but little pressure, making a simple and easy operation of what is now often a very difficult one.

In what may be termed the esthetics of the mechanical part of our work our wants are many and serious. Especially do we need some reasonably easy and efficient way of substituting for gold, in the front of the mouth, porcelain inlays or something analogous in color and appearance,—something that will represent a tooth.

Nature should be the model for our fillings, our ideal to work toward, as much in color as in contour and restoration, and we should always feel that the glaring displays of gold we so often see are a reproach to us as a profession.

In hardly any way can you use your time and energies to greater advantage than in trying to solve this difficulty. Much has been accomplished, but the plan by which it can be done easily as well as effectively has not yet been formulated. If this want were more generally felt, if the ideals of the profession were higher in this respect, the makers of porcelain teeth would come to our assistance, and we would have inlays to our hand that with comparatively little grinding and shaping could be used to advantage. Even the makers of the various cements and preparations of gutta-percha could help us materially, if we but insisted that we must have something of proper tooth-color.

In my mind's eye our needs amplify as I go on : there is almost no end to them ; but I was to be brief, so this must be the last of my illustrations.

Now, having suggested a few of the many needs of the profession, and the necessity of earnest work that these and other needs may be met, how can our enthusiasm—that dead earnestness of purpose—be aroused which will alone bring forth good results?

With a few, in every profession, that seriousness of purpose and earnest enthusiasm is innate; but with the great majority it exists only after cultivation, and the only way I know of to cultivate it is to put ourselves in constant touch with the earnest few. Cultivate even affectionate friendliness with your enthusiastic professional brother, visit him in his home and his office, and be sure to have him visit you, and in these communions will be begotten an earnestness which you have not dreamed of.

In an article recently read before the First District Dental Society, and since published in one of our dental journals, the essayist propounds the following: "Would not the dental mode-man, the dental artisan, the dental mechanic, be more just when we consider that as doctors and professors of dentistry we do the title so little honor?" This, in relation to the right of our occupation to be called a profession. I hope there are no such pessimists before me. If there are, the antidote for the poison is at hand, and is just what I have proclaimed above. No man can keep in touch with the master spirits of the dental world, no man can keep up with the dental literature of the day, and feel that he does not belong to a profession; but every man who does this will try to do his part in our general elevation, in the finding of solutions for our many problems and difficulties, and by making the profession the richer by his membership in it he will give himself the best right to be called doctor.

THE TREATMENT AND FILLING OF DEVITALIZED TEETH.

BY DR. C. A. FIRTHE, QUEANBEYAN, N.S.W.

As I have been considerably indebted to the columns of the DENTAL COSMOS for a large amount of valuable information, I think it only fair that I should give the methods of treating devitalized teeth which I have found most successful.

Fully seventy-five per cent. of my cases are those in which the pulps require devitalizing, simply because the majority of people here only apply to the dentist when driven to do so by severe toothache. Before proceeding further, I may mention that I practice in a town of about fifteen hundred people, and any failures I would be almost certain to hear about.

My method with the six front teeth is as follows: Remove the pulp entire, if possible, by means of a Donaldson's broach, apply the rubber-dam, and twist a few shreds of cotton around a fine Swiss broach, the temper to be previously drawn; dip the cotton in a fifty per cent. solution of peroxid of sodium (Na_2O_2), and thoroughly cleanse the canal by repeated applications of the solution; now wash the cavity out with alcohol (using a hypodermic syringe to get into the canals), dry same with hot air blown through a Richmond hot-air syringe by means of a foot-bellows, then insert an Evans root-drier in canals, and they are ready for filling. The preparation which I have used with the greatest satisfaction for eighteen months is salol in combination with about five per cent. of either iodoform or thymol. The latter I believe to be the best.

The preparation is melted at as low a temperature as possible ; a minute quantity of cotton wool is made hot by holding it over a spirit-lamp, and dipped into the melted salol compound and quickly carried up the canal to the apex by means of a fine Swiss broach ; now fill the rest of the canal by injecting the same preparation by means of a *hot* hypodermic syringe, wait a few minutes to allow the salol compound to set, wipe surplus away, then line cavity with thin cement, and fill cavity with either amalgam or gold, placing the first portions in position while the cement is soft.

I remember reading in the DENTAL COSMOS that a gentleman at one of the society meetings said that it was almost impossible to melt and flow salol into an upper canal by means of a hot broach. I quite agree with the remark. I tried that plan repeatedly, and failed, but any one can get the salol to apex of root if used as I have outlined ; furthermore, the canal is easily unfilled by the application of heat, should occasion arise at any future time.

In treating teeth having putrescent pulps, I find that the fifty per cent. solution of Na_2O_2 is the best preparation to get the canals thoroughly clean. The Na_2O_2 forms a sort of soap with the fatty constituents of pulp-matter, and is easily removed by repeated syringing with warm water. I have used Schreier's preparation, but prefer the Na_2O_2. Any one who has not used the Na_2O_2 would be astonished at the effect produced by its thorough application. In cases of abscess I follow the above treatment, and inject a few drops of aromatic sulfuric acid through the canal into the abscess sac ; then dry canals, and dress them with wood creasote, and cover with temporary stopping for three days. At the next visit apply rubber-dam, remove dressings, wash the cavity out with H_2O_2, five per cent. ; then use alcohol ; dry, and dress again with wood creasote for a week. By that time the tooth is generally ready for filling. The canals are filled as described previously. I could quote case after case so treated, and in eighteen months I have had no report of after-trouble. It is really when we come to the question of bicuspid and molar canals that we are forced to realize that some other method than attempting to clean out the canals and fill same is necessary in the vast majority of cases.

I started practice with the idea well drilled into me that it was necessary to not only get rid of the contents of the canals of devitalized teeth, but that the canals must be filled. While I honestly tried to carry out that idea, I was forced to the conclusion that in the greater number of cases the root cleansing and filling were more or less guess-work. I read Dr. Shields's article in COSMOS in which he describes his method of root-filling with gold. Well, I failed to fill buccal root of upper and anterior roots of lower molars, and in those cases in which *I thought* I had succeeded I had after-trouble. Shortly afterward Dr. Miller's article in the DENTAL COSMOS appeared, and I determined to experiment a little upon extracted teeth with Witzel's paste (kindly brought to my notice by Mr. Söderberg, of Sydney, who had been using the paste successfully for some time). I found that the mercuric chlorid formed an insoluble albuminoid of mercury with the contents of the root-canal, and I commenced to use the paste, but I found that unless the pulp was thoroughly dead the application of the paste caused considerable pain for a few hours, so I cast about for some other paste, and after a number of experiments I adopted the following: Thymol, mercuric chlorid, āā two grams; carbolic acid, tannic acid, morph. mur., āā one and a half grams; ol. menth. pip., ol. cassia, equal parts, sufficient to form a stiff paste. Now I am quite well aware that the above is what some members of the profession will call a shot-gun prescription, and for their comfort I say that tannate of mercury is formed before the paste is used, and it is my intention that the salt should be formed, for the simple reason that it is so very sparingly soluble that no irritation is likely to occur by its absorption. The thymol is a good antiseptic. I may here mention that I hold the New Zealand and New South Wales Pharmacy Boards' diplomas, so I ought to be fairly up in chemistry. However, to proceed. The plan I have adopted for three years with very satisfactory results,—no failures being reported in the case of bicuspids and molars,—is the following: After the pulp has been thoroughly devitalized by the application of pure arsenic applied thus, a small piece of cotton wool is saturated with ol. caryoph., and then a minute quantity is taken up on the wool and placed over the exposed pulp, the dressing being sealed with creamy cement, avoiding pressure on the pulp. In passing, I may say that I don't believe in sticky wax, sandarac varnish, and the rest of unreliable rubbish. I think the cavity ought to be sealed absolutely, and I am convinced that cement is the best thing to use. I allow the arsenic to remain in the tooth for three days; at the end of that time I apply the rubber-dam, and open up the cavity with drills, and clean out the contents of pulp-chamber with a large coarse bur, previously dipped in carbolic acid. Now cleanse cavity by the application of a fifty per cent. solution of Na_2O_2, applied by means of cotton wool, wash the tooth out with ol. cassia and spiritus vini rect. (1 minim in 20), dry cavity with hot air, and fill the pulp chamber with the paste, *using bone or ivory instruments to avoid discoloration.* Cover the paste with either a piece of gold or tin foil, fill cavity one-third with a good cement, and insert amalgam or gold, pressing the first pieces into the cement while it is still soft.

After the tooth is filled, I paint the gum about the roots of tooth with equal quantities of tinctures of iodin, capsicum, aconite, and chloroform, the object being to relieve any congestion which may be present. I think it necessary that the tooth be kept dry all through the operation of filling, and may mention that I have found Ivory's clamps extremely useful in applying the dam.

In June of 1895, Mr. T. Söderberg drew my attention to a paste which he was using very successfully. The formula was as follows: Alum exsic., one ounce; thymol, fifteen grains; glycerol, half a drachm; oxid of zinc sufficient to make a stiff paste. I thought the antiseptic far too weak, so I commenced experiments upon extracted teeth. I found that a paste composed of equal quantities of thymol, tannic acid, and glycerol sufficient to make a stiff paste had a better mummifying action upon pulps left in roots. I have used this combination in a large number of cases during the past six months, and as yet everything seems right. In my opinion it would be a mistake to use zinc with tannic acid, as a tannate of zinc would be formed, the color of which is dark brown. With the thymol-tannic-acid-glycerol compound there is very little discoloration, provided bone or ivory instruments are used to place the paste in pulp-chamber. In November Cosmos I saw that Mr. Söderberg had made his paste much stronger by additional thymol, and, after experimenting with the formula as given in Cosmos, I firmly believe the paste will prove a benefit to the profession. By the bye, Mr. Söderberg uses a little cocain with the paste, so as to prevent the pain which arises from the strong astringent action of the alum exsic. He advised me to do so, and I have had no pain reported since doing so.

I believe that by using either of the last two mentioned pastes teeth can be saved and the contents of root-canals be left untouched with some degree of certainty that there will be no after-trouble; but from practical experience with the mercuric-tannate paste, I can say with *absolute certainty* that there will be no after-trouble: the operation will be much shorter than if an attempt is made to remove the pulp from the root-canals and fill same with any material. The patient's time, health, and purse will be saved, and the operation will be satisfactory both to the patient and operator. I certainly think that the thanks of the profession are due to Dr. Miller for his able advocacy of the question.

DENTAL VULCANITE.

BY W. STORER HOW, D.D.S., PHILADELPHIA, PA.

STEEL is hardened by heating it to redness and plunging it in water; it is then gradually reheated to produce the desired temper-color. The process is so apparently simple that almost any one can do it; yet long experience and a high degree of skill are required to properly harden and temper steel.

The vulcanizing process is likewise a simple one, but the production of good dental vulcanite is very unusual, because the art in its seeming simplicity is commonly deemed to require but little thought or skill. It is, however, a great mistake to jump to that conclusion, for the making of a fine, strong, solid, odorless vulcanite denture demands careful, intelligent attention to many essential details.

The plaster model should be smooth and hard. The waxing up is to be done neatly and of the right thinness for the vault-part, with a judicious thickness of the ridge and gum parts which are commonly much too thick. They therefore get unequally vulcanized, as the thin parts and thick parts will not evenly harden at the same high heat in the same short time. This is a fundamental fact of the first importance, and its general neglect accounts for the porous malodorous dentures so often seen and smelt.

A large flask (the Griswold is the largest and best) should be chosen, and with thick-mixed plaster, free from bubbles, the model is set at an angle, as in Fig. 1, to insure safety to an overhanging anterior ridge, making the parting line along the waxed gum border. Shellac varnish the smooth plaster investment, and when dried oil the parting surface and pour thick mixed plaster for the mold, jarring the flask to drive the plaster over all the teeth and wax surfaces.

Warm the flask and allow time for the heat to reach and soften the wax, so that the teeth will not be dislodged on separating the flask. Remove the wax and pour boiling water over the model and mold, to melt and wash out the remaining wax. Then with alcohol and a camel's-hair pencil brush the exposed teeth and pin surfaces to dissolve the wax or water film, which otherwise will prevent adhesion of the vulcanite; and here is disclosed a common cause of loose teeth, the breaking of unsupported teeth, and of foul plates. That film also prevents a close fit of the cement stopping of section joints, and allows the vulcanite to flow between the cement and the sections to make a dirty joint. To provide for the surplus rubber a deep circular groove is cut in the mold-part, leaving a narrow rim between the model and the groove, as 4, Fig. 1; also shown in Fig. 2. This allows a free flow of the rubber until the flask is nearly closed, when the flow is checked by the narrow rim, and then the increased pressure distributed over the inclosed rubber drives it into every part of the mold and increases the density of the resulting vulcanite.

FIG. 1.

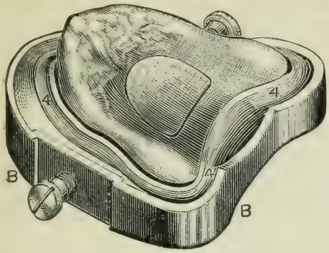
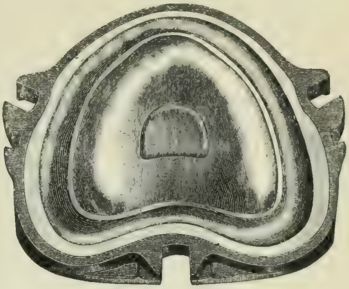


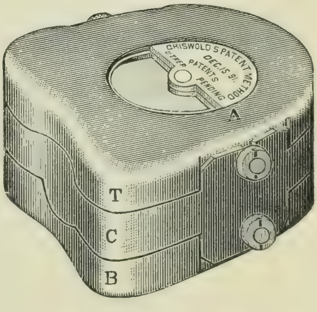
FIG. 2.



It is best to shellac varnish the model and mold (taking great care to keep the varnish from the teeth), and when the shellac dries sticky, burnish tin foil over both model and mold, using a keen-edged knife to cut the foil close around the teeth. This work nicely done will, on stripping off the foil after vulcanization, leave a dense smooth surface, needing very little finishing work. More than that, the surface will be hard and very resistant to the penetration of the oral fluids, or the retention of salivary or alimentary deposits.

A novel and important function of the Griswold flask, Fig. 3, peculiarly adapts it for flasking cases wherein the gum-sections or single teeth have been arranged or ground to fit directly upon the ridge of the model. It is obvious that if the parting line is made between the two parts of the common flask in the usual way, leaving the teeth in the mold-part as shown in Fig. 4, a complete closure of the flask will probably fracture the thin gum of the section (or tht thin neck of the plain tooth) by contact with the ridge of the model. If the flask is not quite closed, then the bite will be lengthened or disarranged. But by locking together

FIG. 3.



the base-part B and center C, Fig. 3, the model A and waxed-up teeth B, Fig. 5, can be set in the deep flask so that the investing plaster D shall cover the top of the teeth and make the parting-line at the edge of the center-part C. Then the flask top T may be locked onto the center C, Fig. 5, and plaster poured through the half-round opening on to the shellacked and oiled parting surface to form the mold-part E. This subsequently serves as a plunger to drive the rubber R, R, into every crevice around the teeth. The grooves for the surplus S, S, should be deeper and nearer the teeth than shown in the sectional view, Fig. 5.

In packing the rubber, there is opportunity for both judgment and skill in cutting suitable pieces, keeping these and the flask-parts warm clean, and packing the pieces in close contact without much excess of material. The surplus groove should, however, be ample to allow the complete closure of the flask after immersion in very hot water, followed by strong screw-pressure. The closed flask should be securely locked to retain the valuable compressive action for making the vulcanite base dense.

Fig. 4.

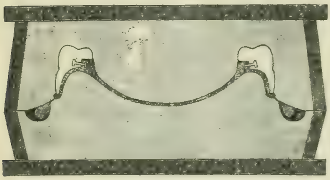
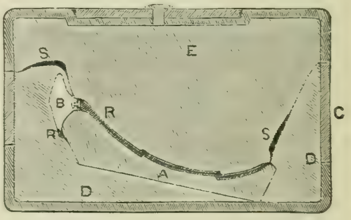


Fig. 5.



A rubber of well-known purity, strength, color, and vulcanizing heat period is always to be used, but it is a very important fact that the proper heat and time limits are to be varied in accordance with the differing thickness of the several portions of the case in hand; the best results being generally attained by a gradually raised and finally sustained low and long heat. For instance, with a rubber scheduled for one hour at 320° F., a large denture having thin palatal with thick ridge and lip portions will properly require a gradually rising preliminary heat of full forty minutes, and a final period of an hour and a half at 310° F. The surprising excellence of the hard and tough product will well repay the extra expenditure of time and care.

If found necessary (as it seldom should be) to do considerable filing and scraping in finishing such a denture, no holes and stench-traps will be found in that vulcanite, because intelligent provision has been made for the slow and certain interstitial evolution and elimination of the sulfuretted hydrogen which is often confined within the vulcanite skin to form the foul pores and pockets resulting from the commonly crude and quick process.

A first-class automatically regulated vulcanizer is preferable, and the best can be none too good considering the professional work to be done. In any case the vulcanizer should be steam-tight, then water a quarter of an inch deep will be sufficient, and will not boil into the flask to soften the plaster and otherwise cause injury to the vulcanite.

MOLECULAR ATTRACTION IN ROOT-FILLING.

BY H. W. ALLWINE, D.D.S., OMAHA, NEB.

(Read before the Omaha Odontological Society.)

GENTLEMEN,—At a former meeting of our society you requested me to present experiments and prepare a paper on the above subject. I take pleasure, therefore, in reading this paper and presenting for your examination some of the results of my work.

That I might clearly note the action, in small tubes, of various materials used in filling roots, I drew out small glass tubes, conically shaped, varying in size and form, as do root-canals. I call them tubes, but you will notice that they are cone-shaped, as are root-canals. Some are large, while others are so small that the smallest broach cannot be passed into them. In using roots of teeth for experimental work, the progress and result of the work cannot be seen. Some of the material may appear at the apex, while at the same time some of the root may remain unfilled.

Before discussing the various root-filling materials, I wish to prove to you, by ocular demonstration, that capillary attraction, a form of molecular attraction, does not come to our aid in root-filling. We find capillary attraction exists only when the tubes are open at both ends. Root-canals are practically sealed at one end. I have here a number of variously formed tubes. Some are open at both ends, while others are sealed at one end. I now place the open ends of the various tubes into this colored water. Notice how rapidly it rises through the entire length of the tubes open at both ends, while it does not enter at all the tubes sealed at the outer end. This is an important observation, because it is at variance with the teaching of some of our prominent writers. One, even, in his enthusiasm for salol, goes so far as to tell us, in his journal, that he squirts it into root-canals, indiscriminately, with a syringe. I am not here to state that others cannot do thus and so because I fail therein, but I do say that it is contrary to nature's laws,—science,—and I cannot do it. Large tubes, sealed at one end, into the entire length of which the needle can be passed, may be filled nicely by a syringe, with liquid, by passing the needle into the entire length of the tube, pressing on the piston, and gradually withdrawing the needle.

Before reading further, I will demonstrate these truths of science with the tubes and syringe here at hand. You will note how readily the liquid passes into the tubes open at both ends. Notice, too, how easily I fill the tube sealed at one end by passing the needle into the entire length of the tube, pressing on the piston, and gradually withdrawing the needle. Now you will observe I pass the needle part way up this sealed tube, press on the piston, and the liquid is forced backward, leaving a column of air in the tube beyond the needle-point. Why is this? It is a law of liquids that, if left alone, they assume a spherical form. When the first drop of liquid comes to the point of the needle it becomes spherical, touches the walls of the tube, sealing in the column of air beyond. This is likewise true in root-filling.

It will be seen readily, therefore, that these sealed tubes can be filled only by working the filling-material in with an instrument. Here molecular attraction, or adhesion, comes to our rescue. By using a material between which and the side of the tube there is adhesion we succeed. By drawing the broach backward and forward, we carry some material in each time that adheres to the walls and that which is already in. Thus we gradually extract the air and fill the tube. With me it is impossible to do this with material having no adhesion for the tube or with liquids. They are carried back and forward with the broach. You have all noticed these facts in the use of various materials in your daily work. By the use of these glass tubes I can note every movement of the various materials within the canals.

The reading of a paper on salol, and the discussion thereof, at a former meeting, suggested this paper and these experiments. Though I used salol sparingly, yet I was its friend and advocate. This was not because I *knew* of its positive merits, as were claimed for it, but because a number of good men were so loud in its praise. I am completely disappointed,—forced to be so. In large tubes it can be used nicely, but so can every other material that I used. It is the most difficult, according to my observation, to insert into canals of various forms and sizes, as we find them. Being in liquid form, the particles move freely backward and forward with the broach. The air is not extracted, but is mixed, as it were, with the salol, leaving the solid salol in sections. There is so much uncertainty of its action in the tubes, at my hands, that I would be afraid of it as a permanent root-filling. I would find hope only in its antiseptic property.

A prominent writer and authority on dental subjects places a gutta-percha point on a root-canal plugger, softens it in chloroform, floods the canal with chloroform, then presses the point into the canal. This method is good for filling large tubes, leaving chloroform out of the tubes, however. In small tubes it does not work at all, unless the point be thoroughly softened ; then it is simply a case of chloro-percha filling.

In my experiments an excess of chloroform in the tubes thins the filling-material too much, and, after evaporation of the chloroform, does not leave the tube filled. By softening the small end of a gutta-percha point in chloroform, I can press it to the end of tubes nicely. The tube may then be filled with any material. In this way I get positive results.

As we must depend upon the sense of touch on the part of the patient, as to when the canal is full, the conclusion reached in my work on the glass tubes would make it imperative that the canal be not flooded with any medicament, as it is forced ahead of the filling-material proper. This is felt by the patient, and we force no more material into the canal. When the liquid is absorbed, the root is unfilled. I believe many roots are thus filled, and the operator congratulates himself on his grand success (?).

With oxychlorid my work was not a success in tubes too small for my broach. It hardened so that I could not force it ahead, to get positive results.

With chloro-percha my experiments were more satisfactory. Results with this material were more positive when the chloro-percha was of the proper consistence. When used thin, even though the canals were quite full, the filling was very defective after the chloroform had evaporated. The gutta-percha was then separated into sections, and even they were not solid. It can be forced into the smallest tubes when quite thick,—almost stiff.

When filling sealed tubes the elasticity of the air and gutta-percha was quite apparent, in that the filling-material tended to come out of the tube perceptibly, leaving a small space unfilled. I am inclined to think this same tendency exists in the filling of root-canals. It may be retained, as desired, by cement in the pulp-chamber.

The above are all the filling-materials with which I experimented thus far.

It is needless to say that I find canals in which I am unable to do work satisfactory to myself. We all find them. For the treatment of these we look forward to the mummifier, hoping one may be discovered whose good effects will be permanent.

MEDICINAL PREVENTION OF DENTAL CARIES.

BY GEO. HOWE WINKLER, M.D., D.D.S., NEW YORK, N. Y.

(Read before the New Jersey State Dental Society, August 1, 1895.)

DENTAL caries, or the decay of teeth, is due to a morbid state of the system—a dyscrasia,—and can be prevented by intelligent medicinal treatment just as certainly, and equally as often, as the exhibitions of other dyscrasias can be ameliorated or arrested by proper remedies.

The theory of Professor Miller, of Berlin, that dental decay is due to an acid destruction of the lime-salts of the teeth, produced or furthered by the agency of micro-organisms which secrete lactic acid, is generally accepted. The importance of the micro-organisms in their destructive ability, however, is a question with some members of the profession. My conclusion, after a careful perusal of Professor Miller's very instructive and able article, in Litch's "American System of Dentistry," was that micro-organisms were a secondary factor in tooth-destruction, and that conclusion has been maintained and strengthened both by the result of clinical observation in the mouth, as well as by the success I meet in the medicinal treatment of patients for the prevention of decay.

Every dentist has observed in some mouths a snow-white line on the enamel of teeth along the gingival borders of the gums on both labial and buccal surfaces, where neither softening nor decalcification had yet occurred, and where, especially on the incisors, no lodgment of micro-organisms had been maintained. That is the first decolorization due to the action of acid on the translucent enamel, and that acid is an elimination from the mucous glands of the gingival borders, and is the positive evidence of a morbid systemic condition.

Micro-organisms exist in all mouths regardless of the absence or presence of decay, and while malformation or deep sulci in some teeth might afford them a sufficiently long and uninterrupted lodgment to originate caries at those points, in the vast majority of cases an acid disintegration of the enamel first occurs, and the micro-organisms burrowing into the softened mass take possession and continue the work of destruction.

An acid, then, in my opinion, is the *primary cause* of decay. Not an acid that may have been taken into the mouth as food or medicine, nor one that may be the product of decomposition of particles of food that have lodged about the teeth, because in either case these acids are too much diluted and too quickly washed away by the fluids of the mouth to be deleterious, but an acid which is *excreted*, not *secreted*, by the mucous glands of the mouth ; an elimination by these glands of some unhealthy systemic condition, an acid which is the positive evidence of a morbid state,—a dyscrasia. This specific morbid state, or dyscrasia, is just as amenable to medicinal treatment as are those morbid states resulting in a diseased condition of the liver, or kidneys, or the gastric glands of the stomach, and, like all other dyscrasias, must be treated by medicines internally administered.

Local treatment and topical applications are just about as efficacious for the cure of diseased mucous glands as the painting of iodin over the site of the liver would prove efficient in a diseased condition of that organ, or as the application of a porous plaster to the small of the back might prove curative in diabetes mellitus.

The dyscrasia which results in caries of the teeth is a hereditary transmission, generally of innocent origin. It is the natural sequence of the mistakes, the over-indulgences, the wear and tear and strain of civilization ; it is a part of the price that nature pays for the theories, the practices, and the privileges of modern life. To quote from a paper I delivered last November before the Homeopathic Society of New York, and published in the DENTAL COSMOS of January, 1895, entitled "A Pathological Condition of the Mucous Glands of the Mouth," this dyscrasia "is non-syphilitic ; it is not due to a want of cleanliness, it is almost universal. The number of persons affected by it is increasing. In the vast majority of cases it exists in patients who could by no possibility have acquired it during their own lives, either through disease, salivation, or other provocative causes." It evidences its existence in each individual at intervals, not periodic, but at intervals of longer or shorter duration ; and while it exists at all stages of life, it seems most frequent and particularly destructive in youth, and at the approach of puberty, the young person presenting generally a splendid physical development and an otherwise robust state of health.

The evidences of the dyscrasia which results primarily in caries are generally quite conspicuous, and consist in a loss of neatness of the gingival borders and interproximate spaces, broken down or swollen margins, inflammation ranging in color from turgid to bright red, and in condition from simple to phagedenic, and sometimes a pronounced stomatitis involving the entire mucous membrane of the mouth. The teeth are often covered with a tenacious, slimy mucus, which, if scraped off and smeared on blue litmus paper, will in many instances cause the pink color of acid reaction to beam into view ; the destruction of tooth-substance, when the dyscrasia is active, ranging in extent from a few simple cavities to an apparent melting away of the entire dental equipment.

So much for a concise and simple statement of the theory.

The treatment of this dyscrasia is extremely simple, and at the same time marvelously efficacious. I think that on an estimate I can claim as the most modest limit at least fifty per cent. of dental caries is absolutely preventable.

I regard local treatment and hygienic care of the teeth, *for prevention of decay*, as almost utterly useless, and depend entirely on internal medication to reach, arrest, or cure the dyscrasia when I meet it. The mucous glands, during the active stage of the dyscrasia, excrete their acid eliminations continually, and the hours between the periods of cleaning, and the long hours of the night, afford ample opportunity to these corrosive exudations to work out their destructive results.

In justice to myself I desire to explain the liberal system which I hold in medication.

My dental diploma was conferred by the Baltimore Dental College, and my medical diploma I received when I graduated from the Medical Department of the University of Georgia; and while I hold fast to *all the good* that allopathy places within my reach, I am liberal enough to accept, and be grateful to, homeopathy for some remedies which it has given me, and I treat the diseases of the mouth eclectically, using such remedies in each case as my judgment warrants.

In the case of simple acid excretions, I find the homeopathic preparation of kreosotum an almost perfect specific; the twelfth decimal, or 12x, is the potency I prefer; a lower potency frequently produces a laxative result which is undesirable. I desire to emphasize the fact that I never prescribe internally, kreosote in the mother tincture or pure form for any condition whatever.

I administer kreosotum in three ways, according to my patient. Three or four powders of the 12x, each containing about as much as would rest on a dime, are given at night between the last meal and bedtime, at thirty minutes apart, and two powders in the morning before breakfast, one immediately on the patient's rising and the other in twenty or thirty minutes. In place of powders I sometimes give a dram vial of the kreosotum, 12x in liquid preparation, prescribing one or two drops in water in the same number of doses and at similar intervals as the powders; or I prescribe the remedy to a great many persons, especially children, in the form of pellets. I take a four-dram vial of pure sugar disks, and moisten them with liquid kreosotum 12x, and prescribe one or two every hour during the waking hours. I advise waiting half an hour after meals, where coffee or wine has been taken, or after smoking. I never diet a patient, because *I never saw one* who would stick to a regime unless the dyscrasia which was being treated was accompanied by great pain or distress. I keep the kreosotum treatment up from forty-eight hours to three or four weeks, as each case may demand.

The above minute account of how I prescribe kreosotum has been deemed justifiable, because in the last paper I wrote, in which the value of that preparation was extolled, I omitted the details of its administration, and received a number of letters from gentlemen in the profession asking for further information in its use.

When I discover in a patient's mouth, in addition to the acid excretions, a pronounced gingivitis or stomatitis, simple or ulcerative, my procedure is quite different. In Hare's "Therapeutics," vol. ii, Dr. A. D. Blackader (article on diseases of the mouth) recommends chlorate of potassium in stomatitis; and in ulcerative stomatitis claims that it is almost a perfect specific, using it both as a gargle and in tremendous doses internally. He writes, "We do not only secure a local action by their use in these ways, but also a secondary action by the elimination of the drug through the salivary glands. Potassium chlorate when taken internally appears in the saliva in five or ten minutes, and continues to be secreted for some hours. In this way we obtain a secondary topical effect much to be desired, because less irritating and more continuous. The quantity administered during the whole period of the twenty-four hours to an adult should never exceed one or one and one-half drams, and to a child of three years twenty or thirty grains. It is best given in small doses repeated every two or three hours." He cautions watchfulness on the part of the nurse or attendant, and an instant cessation of the drug on the first signs of danger.

I must confess it is incomprehensible to me how a gentleman of such fine attainments and high ability as Dr. Blackader possesses can place such value on a drug so poisonous as potassium chlorate, and can administer it in such large and dangerous doses, when in his own estimation its chief value, if not its only real merit, lies in the fact that it is a good gargle. He seriously endangers the kidneys, if not life itself, for the purpose of securing a topical application.

I sometimes prescribe that drug internally in small doses, but prefer in these cases the iodid of potassium; or if I desire to obtain the alterative action of iodin in a more delicate and easily digestible form, I give syrup of hydriodic acid. I prescribe the following formulas:

℞—Iodid. potassium, gr. 200;
Syr. sarsaparilla co., ℥ iii;
Tinct. gentian. co., ℥ ii;
Aquæ, q.s. ad. ℥ vi.
Sig.—One teaspoonful after each meal.

That formula gives a little over four grains of the iodid of potassium at each dose for a period of sixteen days.

℞—Iodid. potassium, gr. 100;
Syr. sarsaparilla co., ℥ iii;
Tinct. gentian. co., ℥ ii;
Aquæ, q.s. ad. ℥ vi.
Sig.—One-half teaspoonful as directed.

The directions given to the patient are, one dose after each meal and one dose between meals, the last being taken at bedtime. That formula gives a little over six grains per day; and while the entire quantity is very small, the oft-repeated doses are very effective.

The syrup of hydriodic acid I prescribe in doses of from twenty drops to a child, up to a dessert-spoonful to an adult, three times a day after meals. The iodin in this preparation being very much more active than in the iodid of potassium, care should be exercised and small doses preferred. After the iodin treatment I then prescribe kreosotum as above, and keep it up as long as the case may require it, generally from one to four or five weeks.

As local aids in the form of gargles or mouth-washes, I prescribe:

℞—Potassium chlorate, ʒ ii;
Aquæ, ℥ iv.
Sig.—Gargle.

or

℞—Carbolic acid (cryst.), gtt. 10–15;
Glycerol, ℥ i;
Rose-water, q.s. ad. ℥ iv.

Sig.—Mouth-wash.

or

℞—Borolyptol.
(Directions on bottle.)

all of which, except the first, are pleasant as well as stimulant and detergent.

After the above treatment has relieved my patients, I require them to let me examine the mouth about every three months, and I renew the treatment from time to time as seems necessary.

In the case of persons wearing rubber plates, I advise immediately a change to gold. Rubber plates hold the excretions *in situ* and the heat of rubber promotes and accelerates fermentation, adding tremendously to the excoriating action of the exudations.

All local applications have their value in the treatment of diseased conditions in the mouth, and all hygienic methods such as cleansing the teeth, removing tartar, readjusting or replacing improperly selected or imperfectly adjusted appliances, are necessary, but their value lies in the fact that they are adjuncts or aids only to the systemic treatment which is *necessary to the cure* of the diseases we find in the mouth.

The number of fillings required by patients, especially the young, after having undergone the above treatment, are very few in number. The arrest of decay, or a tendency to it, is marvelously pronounced.

I have one little patient who suffered from the ravages of decay to the extent of thirty-three cavities in the course of five months. I then treated her systemically, and in eighteen months she had but four small decays, and they occurred during an absence of five months from my observation and care. While she was with me, and taking from time to time small quantities of kreosotum as I directed, she was absolutely free from caries.

In conclusion, I maintain that dental caries in nearly all cases is the result of a morbid systemic condition; it is the evidence of a dyscrasia, and it is amenable to medicinal treatment as are other dyscrasias. I trust my contention has been sufficiently strong and convincing to induce an adoption of my practice in this direction. I promise you the results will be more than gratifying.

Systemic medication in dentistry has come to stay, and opens up a field of immense value and interest. Its pathways are bordered by the flowers of hope and reward, and lead the faithful to that high and dignified plane of professional life,—a specialty of medicine.

WHAT SHALL BE DONE FOR THE TEETH OF THE POOR?

BY RICHARD C. NEWTON, M.D., MONTCLAIR, N. J.

(Read before the New Jersey State Dental Society, August 3, 1895.)

To the writer, at least, the above question is an exceedingly puzzling one, and it is chiefly in the hope that the gentlemen present, who have doubtless puzzled over the question as much as I have, will be able to throw some light upon it, that I have been led to address you quite briefly upon it to-day. I think that we need not take up much time in considering the importance of the question. Perhaps, however, there may be some who do not yet appreciate the value of the teeth in the human economy. The teeth are at once the indication of sound health and the conservators of it. An edentulous person may "gum it" for a number of years and enjoy a fair degree of health, but I say without hesitation that, as a rule, poor teeth indicate poor digestion and malassimilation of food, which is the foundation of a superstructure of disease ; and the rule just enunciated is quite strong enough to bear the exceptions, and the persons who can remain in tolerable health in spite of bad teeth or no teeth for any considerable length of time are, in my experience at least, very few in numbers.

Admitting, then, that the teeth are at once the indicators of good health and the conservers of the same, that no one can remain healthy for a considerable period of time without good teeth either natural or artificial, what are we going to do to preserve the teeth of the poor, or to induce this class to preserve their own teeth? Among the well-to-do the frequent warnings of the family physician, but more especially the dictates of fashion, which have ordained it to be the worst of bad form to have bad teeth, drive nearly every one to the dentist as soon as his teeth begin to decay. How shall the poor be induced to follow a like course? How shall they be taught the necessity of consulting a dentist early enough to prevent decay and anticipate the destruction of the teeth? I confess that this is to me a very difficult problem ; probably much light can be thrown upon it by the discussion to which I trust this paper will lead. Only practical dentists know just how much the poor really come to the dentists, and just how far they appreciate the value of good teeth.

I have been informed that at the institutions in New York City where dental work is done in clinics at about one-half the rates charged by dentists in their offices, there is such a crowd of patients that it is difficult, if not impossible, to accommodate them all. For my part I believe that doctors are far too careless in the matter of examining their patients' teeth and directing that the dentist be consulted in every case that requires his services. I go further than this, and assert that the text-books on medicine and hygiene are altogether too careless in impressing the need of inspecting the teeth of patients upon the minds of the younger practitioners. Good teeth are just as necessary, yes, I may say, far more necessary to good health than good eyes, and yet we have upon our shelves scores of works upon the eye and ear and few or none upon the teeth. The muscle-cutting oculist fills pages of our medical periodicals with his disquisitions ; but the dentist either does not write, or his writings are published in the journals especially devoted to dentistry, and the general practitioner does not see them.

Of course every well-informed physician appreciates the value of good teeth, and when asked for an opinion insists perhaps strenuously enough upon his patients going to the dentist. But I do not believe that enough attention is paid to these enormously important organs by even the best family practitioners ; and when we reach the class of doctors who practice among the poor, it is quite certain that they do not pay enough attention to their patients' teeth, especially to the teeth of the children. The teeth of the very poor are, according to my observation, almost universally bad, and, beyond occasionally having an aching tooth extracted, there is practically nothing done by this class of people for their teeth. Their bad and insufficient diet causes a lowering of the vital forces in general, and especially is the cause of indigestion, malassimilation, faulty metamorphosis, and most of all, perhaps, of dental caries ; as the teeth decay and break down it becomes harder to properly masticate the food, and there arises a tendency to eschew proper food and to seek for softer and more highly-seasoned food. Working people should eat food that requires considerable mastication,—strong food, so called, like the black bread and beans upon which the German peasants flourish so well. Another important consideration is that the dyspeptic stomach craves stimulation, and so the vicious circle is completed. Men and women drink rum to quiet a gnawing in their stomachs, which often is aggravated, if not caused, by bad teeth.

It is folly for me to point out to a body of dentists the evils of bad teeth. I only allude to them in order to bring them up for discussion and to emphasize what I am about to endeavor to suggest a remedy for. Of course the poor need to be instructed in numerous matters pertaining to health and hygiene, ventilation, personal cleanliness, avoiding damp and unwholesome dwellings, wearing sufficient clothing, etc. Into most of these questions philanthropic and altruistic people have entered, and it is presumed that their labors have had some effect in mitigating the sanitary evils of the lives of the laboring classes. Is it necessary also to begin a crusade in order to induce the poor to go to the dentist as soon as their teeth begin to decay? I am inclined to think not, at least I believe that very considerable numbers of them would have their teeth properly attended to if they could afford it. It is certain that the free ear, eye, throat, and skin clinics are well attended, and while, from the nature of the case (dental caries being more insidious in its course, perhaps, than most maladies), the poor might not seek the aid of a dental clinic so freely as they do the clinics just mentioned, still I believe that vast numbers would avail themselves of such clinics if they could. This would be specially desirable in the case of children. Dentistry has probably conferred no greater benefit upon mankind than the practice of filling and preserving, as long as possible, the deciduous teeth. I need not enlarge on this topic, its importance is now so generally acknowledged. We can occasionally induce a poor mother to take her child to the dentist to have the first teeth filled, but she will generally decline to do so on account of the expense. Even among the well-to-do the value of preserving the milk teeth is not yet sufficiently appreciated, and naturally is still less so among the poor and uneducated. Still, much could be done if it were not, as said before, for the expense. These desultory remarks have been intended to show, first, that were it not for the attendant expense the poor would much oftener consult the dentist than they do, and, second, that doctors very generally feel the necessity of sending their poor patients to the dentist, just as they do now to the oculist, the aurist, and the dermatologist, if it were practicable. And third, that, as the doctors themselves become, as a class, more liberally educated and broad-minded, they will more truly appreciate the value of the teeth and will more and more instruct their patients in the matter, and so knowledge, taking its usual course from the higher strata of society, will percolate down to the lower, and there will be a greater and still greater demand for dental clinics for the poor, and steps will have to be taken to meet this demand. I feel positive that in a comparatively few years such facilities will have to be provided. You may say that medical charities are at present entirely overdone, and that many an honest and worthy practitioner is cheated out of his just fees by these eleemosynary institutions. Admitting that injustice may have been done the struggling medical man, has that fact prevented an enormous increase and expansion of medical charities and clinics of every description? and it may safely be questioned whether the lot of the struggling practitioner is harder to-day than it used to be. An hour or so before writing these lines I have read of a half-million dollars bequeathed to the dispensary of the Long Island College Hospital. The amount of money given to hospitals and medical charities of all kinds is simply enormous, and is increasing year by year. The world, it seems, never was so near as it is at this moment to acknowledging that we are our brother's keeper, and we must provide for his wants so far as we are able, both spiritual and physical. A poor man can have his every bodily ailment and deformity gratuitously treated, and that too by the best available skill, except his teeth,—perhaps the most generally important and necessary of all the special organs. This long-felt want will surely be filled. Why should this society not take the initiative in the movement?

There is another aspect of the case which intimately concerns you as members of the dental profession. Dentistry has made claims to be considered a special branch of medicine, and there is undoubtedly a growing disposition among practitioners generally to admit these claims. The venerable and distinguished Professor N. S. Davis publicly acknowledged, a number of years ago, his adherence to the view that dentistry is bound to occupy such a position, and it cannot be doubted that his words were prophetic. With increased honors come increased responsibilities. The higher position a man attains in the medical profession, the more time and thought must he give to charitable work. So the dentists, if they wish to be esteemed by the public generally as specialists of medicine, must give of their time and skill to treating the poor. They must do as the oculists and the aurists do, or give up, in some measure at least, the place which they deserve to hold among their professional brethren. It is the willingness to give time, thought, and skill to the service of the poor which has elevated and ennobled the profession of medicine. It is this that has made it the most generally beloved and respected of all the professions. Why should not this society, well and favorably known over the entire country for its enterprise and its scientific spirit, for its efforts to raise the profession of dentistry to the height it ought to occupy and is destined to occupy,—why, I say, should not this society, the New Jersey State Dental Society, celebrate its silver anniversary by setting on foot a movement which is sure to succeed abundantly, which will cover its originators with honor, and will forever stop the mouths of those who have carped at the want of professional spirit among dentists, by asserting that they are not willing to give their services to the poor without compensation?

What more fitting action could be taken to celebrate this auspicious year, the twenty-fifth year of your existence, than to inaugurate a movement for the establishment of free dental clinics for the poor? And why should you not have the honor of doing something that will immeasurably benefit society at large, and will bear fruit by its elevating effect upon the profession of dentistry?

By doing this you will put the general practitioners of medicine under a lasting obligation, which they will not be slow to appreciate. You will encourage physicians to work more faithfully among the poor, because they will feel that, with your efficient help and counsel, their efforts will be so much more efficacious, and you will do your part toward establishing that bond of union that ought to exist between all branches of the practice of medicine.

The healing art, the most beneficent, the most unselfish, and the most charitable of the arts, calls upon all who practice in any of its departments to bear their share of the care and nurture of the poor and the unfortunate. This is your time and your opportunity. Stay not your hands from the good work, but do quickly whatever there is in your minds to do.

THE PRESERVATION OF THE DECIDUOUS TEETH BY MEANS OF CAPS AND CROWNS.

BY LOUIS OTTOFY, D.D.S., CHICAGO, ILL.

(Read before the New Jersey State Dental Society, August 1, 1895.)

THE preservation of the deciduous teeth is a subject which presents many difficulties, and for some years past it has been the aim of some of the most conscientious members of the profession to overcome some of these difficulties and to lessen the necessity for the premature removal of these teeth. It is generally conceded that no material improvement in the general structure of the teeth in the human race can take place so long as extraction is one of the most frequent operations resorted to in the treatment of either the temporary or the permanent teeth. There is little question regarding the fact that the present generally bad condition of the teeth is due in a great measure to the neglected condition of the teeth in past generations. From a dento-physical standpoint, the people of to-day are badly demoralized. It seems hardly necessary to refer at length, before this society, to the importance of saving the deciduous teeth until the exact time when by the operation of nature they should be shed. We generally lose sight of the moral influences that are exerted, when the practice of saving the teeth is commenced early in youth. The impressions of early life are apt to be the controlling influences of the adult, and it seems to me that a habit to save could be more easily inculcated than a habit to have teeth extracted. But the principal thing is the opportunity offered to educate the youthful patient, to form early the habit of care and watchfulness over organs whose importance is at this age generally underrated. The profession of to-day can leave no greater heritage to those of the next generation than the one which has for its aim the education of the children in every sense.

We cannot begin too early in life, and if half the attention were given by the dentist to each case of the child that is given under similar circumstances to an adult, much could be accomplished. As it is, children are often turned away with the comment, "It's only a child." Every one realizes that it is much more difficult to treat children successfully than it is to treat the grown ; that the operation performed under these difficulties is not always as successful, and hence the difficulties are too frequently met by the forceps. It is the dental profession, and not the laity, who is responsible for the generally accepted idea that children's teeth cannot be filled, or that they should not be filled, and I think it is time that the profession remedy the error of which it is the sponsor.

The same treatment which will save permanent teeth will not always save the deciduous teeth ; the conditions are so different that if the operator has not the time or the ability, he will meet it by extraction. It should be placed, however, to the credit of the profession that some of its members early realized the baneful effects of this kind of practice, and that during the past fifty years many crude and unsatisfactory methods of saving these organs have been more or less practiced by them. In this way the practice to destroy the pulp and leave the tooth first originated ; this was improved upon by capping the pulp with some devitalizing agent, then filling the cavity and drilling a vent-hole for the escape of gases which might originate. Crude as these practices were, they began to prove that the importance of saving these teeth had been recognized. The practice of bridging across with plastic fillings from one cavity into another in the case of approximal cavities was resorted to, when the difficulty of retaining fillings in these small teeth was recognized. In short, there is no one here who considers the handling of these cases a pleasant part of their practice.

As a result of the necessity for frequent refillings, each time causing a little more pain and cutting away a little more of the tooth, and for the purpose of overcoming the many unsanitary and unwholesome practices resorted to, I have conceived the idea of saving the deciduous teeth by means of crowns and jackets,—a practice which from its simplicity, ease, and permanence is strange not to have been long since recommended. It is about a year ago that I first performed the operation, and I have since then continued it with perfect satisfaction.

In the case of incisors and cuspids of children, it is difficult, as a rule, to introduce a satisfactory filling, especially at so early an age as two or two and a half years. In the first place, the preparation of cavities is painful, the teeth if carious so early in life are exquisitely sensitive, and the most sympathetically disposed operator's patience is sorely tried in doing something satisfactory ; hence in the majority of cases the result is a cement filling, often hastily and improperly mixed, hurriedly introduced, and perhaps permeated with moisture before a protection against it could be applied. The result is a repetition of the operation at short intervals, sorely trying the abilities of endurance of the restless, wriggling piece of humanity, to say nothing of the increased sensibility occasioned by the repeated cutting away of what little tooth-structure there is.

How much simpler it is to remove only the greater portion of decay, slightly separate the tooth from its neighbors by means of a sand-paper, corundum, or diamond disk, and attach one of these jackets, without taking an impression or carefully fitting it, and cementing it into place. The specimens exhibited will prove how simply and crudely these crowns may be made.

For this purpose I use twenty-four or twenty-two carat gold plate, 34 gauge, or platinum 38 gauge. The pattern is cut out as indicated by the specimen exhibited ; it is bent with pliers, pressed with the fingers around the neck of the tooth, and the edges caught with a mite of solder and cemented into place. Fortunately the deciduous teeth are generally more regular, not so closely in contact, less variable in size in different individuals, than the permanent, and are usually of a shape readily adapted for the fitting of these crowns. The articulation quickly accommodates itself to the crown by either the slight displacement of the crowned tooth or of its antagonist. So much of the work is done outside of the mouth, and when done at the chair or within view of the little patient it is a source of amusement and interest instead of dread and pain. I have some of these caps sticking in place, although the restlessness of the little patients required haste in fitting and attachment.

I have never taken kindly to the method of filling deciduous teeth by bridging the filling-material across the interdental space, although I have been forced to practice it for want of any better means of retaining the fillings in place. In the case of the molars, therefore, this practice offers many advantages. Usually it is better to take an impression in wax, modelling compound, or Melotte's clay than with the Melotte outfit. Dies and counter-dies are quickly made and a cap struck up. Frequently there is no necessity of shaping the crown, as usually it is unnecessary to extend the cap down on the crown, except for a short distance. It is sufficient if it extends far enough so as to hold it in place. Its purpose is merely to serve as a protection to the underlying cement. It is remarkable with what tenacity these caps will adhere even in cases where it has been impossible to prevent the moisture from coming in contact with the cement before it has set. For these jackets or half-crowns I find pure gold most satisfactory. In the specimens shown, several methods of making them are illustrated.

I am very enthusiastic over this means of preserving the deciduous teeth, and have therefore taken some interest in noting what others have done in this line. As far as I have been able to ascertain, the credit for the mention of this practice is due to Dr. W. W. Shryock, of Fort Wayne, Ind., who first exhibited and reported practical cases before the Illinois State Dental Society at the meeting held in May, 1894. As usual, the man who has done this "long ago" comes to the surface, and the following reports have been made :

Transactions of the Illinois State Dental Society at Springfield, May, 1894.

Dr. W. W. Shryock, of Fort Wayne, Ind., exhibited gold crowns on upper incisors of his little girl and boy, which were placed when the children were but two and three years of age respectively.

[These crowns were set February 8, 1893.—W. W. SHRYOCK.]

Dental Cosmos, August, 1894 (*Hints, Queries, and Comments*).

A Novel Dental Operation.—My son, aged two years, has chalky superior incisors, while the rest of his teeth seem to be of a better quality.

We often see this condition in children's mouths, dilapidated or missing superior incisors long before their permanent successors are ready to erupt, although the rest of the temporary teeth are in fairly good condition.

In this case they were clipped off until the laterals, especially, were nearly even with the gum-margin on the labial aspect. They were getting sensitive, for he kept them more or less protected by his lip and would never use them to bite upon.

I decided to prevent their premature loss if possible. By the use of steel dies I struck up four gold caps, of 34 gauge, soldered joint and cutting-edge to give strength, dried the teeth, and set caps with oxyphosphate cement.

They have now been in position about a month, and from all appearances the operation is a perfect success. The crowns are so small and their shape is so natural that their appearance is not objectionable, especially when compared with their former condition.

The boy no longer avoids biting upon the teeth, nor does he keep them protected from thermal changes; on the contrary, he takes great delight in displaying them to many curious observers. The whole operation of making and setting the caps is by no means difficult, nor is the setting of them painful for the child.

Whether or not this is the first case of the kind on record, I am quite certain that it will not be the last.—W. H. Baldwin, D.D.S., Norwalk, Conn.

Dental Digest for March, 1895.

A Novel Dental Operation.—In August, 1894, Dental Cosmos, under the head of "Hints, Queries, and Comments," Dr. W. H. Baldwin calls attention to the work of gold-crowning deciduous teeth.

My practice in this dates back to February 8, 1893, when the superior central incisors of my son, then four years old, were crowned. This practice has been followed by me ever since, including four crowns for an infant daughter in November, 1893, she then being twenty-three months old.

While attending the Illinois State Dental Association in May last, 1894, by invitation of the chairman of the clinical committee, my children were presented and their crowns commended by members, and the belief expressed that this was the first of its kind on record.

This method of treating deciduous teeth must prove of vast advantage in durability and relief from pain.—W. W. Shryock.

Dental Digest for May, 1895.

The Crowning of Deciduous Teeth.—To the Editor of the Dental Digest. Dear Sir,—Under the head of "A Novel Dental Operation," you quote from "Hints and Queries" in Dental Cosmos of August, 1894, in which Dr. W. H. Baldwin calls attention to the crowning of deciduous teeth with gold.

In 1889, when my youngest son was but two and one-half years old, his centrals and laterals were so much decayed that it was an impossibility to fill them with any substance that would be protective in its nature.

The idea occurred to me to crown them with gold, which I did very easily, and the child wore them in comfort until the permanent incisors appeared. I have since in many cases used the same method, and find it very serviceable, although not very artistic.—Wm. G. Cummins.

I believe in cases of this kind credit is due to the man who is first on record. I give no credence to the subsequent reports, and no one can claim priority in that manner. At any rate, if a mode of practice which is satisfactory, saves pain to the patient, gives comfort and saves the nervous system and energy of the dentist, is hidden under the bushel, the claimant should be barred from recognition.

I heartily commend this additional means of preserving the deciduous teeth to your favorable consideration.

PROCEEDINGS OF SOCIETIES.

NEW YORK ODONTOLOGICAL SOCIETY.

A REGULAR meeting of the New York Odontological Society was held on Tuesday evening, February 18, 1896, at the New York Academy of Medicine; the president, Dr. William Carr, in the chair.

The minutes of the previous meeting were read and approved.

The PRESIDENT. It is with sorrow that I announce to you the death, since our last meeting, of one of the oldest and most honored members of this association, Dr. William H. Dwinelle. The president, feeling that the society should be represented at the funeral, and not thinking it advisable to call a special meeting, referred the matter to the Executive Committee for action.

REPORT OF THE EXECUTIVE COMMITTEE.

Dr. WALKER. In regard to our dear friend Dr. Dwinelle, I would say that, at the suggestion of the president, the Executive Committee sent a committee to Cazenovia to attend the funeral ceremonies of Dr. Dwinelle. The committee was instructed to secure a suitable floral emblem, and they sent an ivy wreath with a card attached, bearing this inscription: "A Tribute from the Odontological Society of the City of New York." Your committee this evening received this telegram:

To the Executive Committee of the New York Odontological Society:

Dr. Dwinelle's body was committed to earth with Episcopal services at 3.30 this P.M. Your wreath was laid upon his casket, and was much appreciated and admired by the friends. As he always looked supremely majestic in life, he never looked more so than in death. His conflict is over; his winter ended. May we not hope that his springtime has come?

Your representatives,
THE COMMITTEE FROM THE NEW YORK ODONTOLOGICAL SOCIETY.

At the clinic this afternoon there was quite a large attendance. In accordance with the president's request, your committee arranged the first clinic of this society. These clinics should have been started years ago; but for some reason they were not, and it has fallen upon the present administration to conduct them. Dr. Register, of Philadelphia, is present this evening, and will report his own clinic. Your committee, with the assistance of members of the society, expect to make these clinics important factors for the advancement of dentistry. We shall have, in a very short time, the finest dental outfit that can be obtained, and we shall present everything new in our profession, and especially new appliances. We expect to have as our property all necessary dental instruments, dental cases, chairs, motors, and, in fact, everything belonging to a most complete dental outfit. The dental instrument case which you see here has been presented to the society by Dr. Carr, Dr. Littig, and another gentleman. Dr. S. G. Perry has given us a complete set of his excavators, one hundred and seventy-one in number, and he will present them personally to this society this evening. Dr. A. L. Northrop will present to us the most approved electric dental motor. Dr. Harlan, of Chicago, has presented us with a set of his pyorrhea alveolaris instruments ; Dr. Louis Jack, of Philadelphia, with a set of matrices ; and Dr. John Meyer, of New York city, with a fracture reducer of his own invention, and an instrument for swaging plates accurately. Dr. Gaylord, of New Haven, will present us with an instrument whose usefulness he will demonstrate at our next clinic.

For our clinics we have depended somewhat upon our friends for instruments, and we are indebted to Mr. Frank Harmstad for the dental chair and some of the instruments, and to Dr. Freeman for the electric outfit. We are also indebted to Mr. Wheeler for helping us this afternoon. We hope a proper vote of thanks will be given to Drs. Morton and Register for the very kind manner in which they have come to our assistance. We should also mention Dr. Reade, from the New York College of Dentistry, who was our patient this afternoon.

As we expect to give the clinics on the afternoon of the third Tuesday of each month, there are many little things we might wish for our society, and we depend upon the free-will offering of our members and friends for the same. Whether the members wish to donate instruments or money, it will be very acceptable. When we were holding our clinics at a dental depot, we could ask for anything we needed ; but we hold them here now, and we should have everything we need, down to the smallest detail.

All of which is respectfully submitted.

William Jarvie,
S. G. Perry, } *Committee.*
W. W. Walker,

Dr. S. G. Perry. Since the society decided to institute a series of clinics, it occurred to me that it might be proper for me to present a set of working instruments. Therefore I sent some of my own pattern which were made with my own hands, as a result of many years of revision and re-revision, to Philadelphia, and had a complete set made. The set numbers one hundred and seventy-one. It will be thought by most dentists that one hundred and seventy-one excavators is too large a number for an operating case. It doubtless is. There are instruments in this set that could be dispensed with, but my plan has been to have instruments made for each particular operation, and there is not an instrument in this set that has not been made for a particular purpose. Of course, many of them are not used often, some of them very seldom ; but if the moment comes when it is needed, it is a great satisfaction to have it. They take space in the operating case, and are rather expensive to begin with, but I am quite willing to pay the interest on the money invested for them, and am willing to give them storage room in my case in order to have them ready at the time I want them. They are numbered and put in the drawers in racks numbered from 1 to 171, and after becoming accustomed to them, it is just as easy to take out the one you want as it is for a typewriter to touch a particular letter on the keyboard. It becomes almost automatic. After they are used they are sterilized, and usually before the next patient comes in they are put back in the racks, so that every instrument is in its place and can be picked up at once. They are not always placed in their proper places immediately, because in a full practice there is not always time to get them back after they are sterilized before the next patient is ushered in ; but before I am well on the way with that patient, they are in their places, because the attendant can do that. There is a definite design in these instruments. From 1 to 24 are the battle-ax excavators that are perhaps known to you, plain, hatchet-shaped instruments, but made with rounded points to fit the curves of most cavities. From 25 to 47, inclusive, are instruments that are also hatchets, but not with rounded faces like the battle-ax excavators, but of all shapes and peculiar designs. Then follow instruments (48 to 89) that are made from round blanks. The instruments are sharpened on all sides, made in rights and lefts, shaped to cut from the front and the back, but the cutting face is always on the round side. There is a certain satisfaction in that, because you always sharpen from one side, and the case-hardened surface is supposed to give the best edge. If you sharpen on both sides, after a while you lose that case-hardened surface that you get on the exterior surface. My theory for many years has been that I get a better result in that way from the round-pointed instruments.

After those come instruments made in the form of chisels with square cutting-edges, and they are also made to cut from you and toward you in all necessary shapes. After those come another class that have been for many years, in my hands, very serviceable. We will call them spoon-shaped excavators. You also get the advantage of the case-hardened surface there, if there is such a surface. Many are made in rights and lefts, and they present a great variety. Some are very tiny, and others are bolder and more rugged, and are made for peculiar places only.

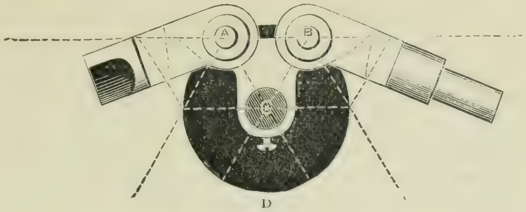
It is not right for me to claim these instruments as my own, for in this late day no one can claim the invention of instruments of this kind, because instruments have been used too long for that. They are modifications. In this set are a number that were peculiarly Dr. Darby's design. Most of them that he made, however, I have slightly modified after my own ideas. The set, taken together, is after all only a modified set of instruments. They contain my ideas, and, as I said before, are the result of a great many revisions and modifications, and many years of careful thought and study in the matter of excavators. The instruments a man uses are the surest test of his ability. I would rather see a man's instruments than hear him talk or read a paper, or even see his work, because one cannot work well with poor tools. In reference to the number of instruments, I am sure I shall be criticised for presenting to this society or putting before the profession a set of one hundred and seventy-one excavators ; but I am not ready to reduce that number by a single one, and I might add to it if I were to do them over. It is worth while to have instruments enough at hand, so they shall be used to the best possible advantage every time and kept in best condition all the time. They are made, as you see, with perfectly smooth handles. The ends are rounded over, so as to rotate easily in the palm of the hand. They are made octagon-shape, so as to give a firm hold. There are no frills on them anywhere. They are blued to within half an inch of the end. I think I got that idea from Dr. Lord, although I am not quite sure. The idea was that they should not glisten and become tiresome to the eye. They are made very smooth. There is not any occupation in the world that calls for a greater delicacy of touch than the use of dental instruments. The skin should be soft, and not be allowed to become hard and stiff by the use of instruments that are roughened for the sake of getting a firm hold. If a smooth instrument be made octagon-shape, it is all that is needed to get a firm hold. For my part, I can get a finer feeling by having the instrument made smooth. I think the reason we all enjoy the use of wood handles is that they are smooth. It makes me nervous to attempt to hold the milled instruments that are made by machinery and are on the market. The battle-ax instruments are now made by some of the manufacturers in a way that I do not approve of. They are not polished and smooth, and I am very sorry that they are made that way. I present these instruments with my compliments to the Odontological Society, for use at its clinics.

Dr. REGISTER, of Philadelphia. I apologize for not presenting a prepared report to this society, as had been my intention. I have used a number of Dr. Perry's instruments, and among other remarks he has made in regard to them, one struck me forcibly : that was, that we all need good instruments with which to work. I have been working in this direction for many years to get an engine that would comply with the demands made upon it, and to the extent that I have succeeded it would be a great pleasure for me to explain it and present one to the society.

I will, in a few words, give you the principle of the engine and how it works. The arm is compensating and adjustable in every direction ; the more novel feature, however, being the construction of its joints. These consist of an elbow, wrist, and shoulder joint, and represent a human arm ; they are of such a character that it can be manipulated more extensively than that member. In passing it from one angle to another, as you can do rapidly, the great trouble is to maintain perfectly uniform tension of the cord as a fixed condition at all angles without the use of springs, which change the perfect smoothness of motion of the driving-cord. A cord engine is undoubtedly the most satisfactory for the reason there is absolutely no "back-lash," and in a well-made instrument the noise conveyed to the tooth and sensory nerves in operating is reduced to a minimum, which makes it more tolerable for the patient, and is also a great point gained for the operator.

What I have accomplished in these joints is based upon a study of the circle. Take a circle and divide it by three lines drawn through its center so as to convert it into six equal sectors. Each of these sectors or quantities will contain an equilateral triangle. An equilateral triangle is an absolutely true figure, just as a circle or a square is ; a circle, or wheel, being, in my estimation, the greatest discovery that man has ever made, for without it civilization would not have made the progress it has. The world moves on wheels !

If we take either a square, a triangle, or a circle, we have a base upon which all unequal conditions rest. If you draw two lines at right angles, it is the first deviation from an equilateral triangle, being a right-angled triangle. From that you derive all the unequal triangles. There is but one perfect circle, perfect square, and perfect triangle, but if you go into the unequal conditions they are endless. If you take an equilateral triangle, A, B, C, hinged at two of its angles (A, B), and at the third (C) you center a wheel (D) whose radius is equal in length to the length of one side of the triangle, it will necessarily cause the periphery of the wheel to pass through the two angles which are hinged. (See cut.) The supporting arms are attached to the hinged angles, by which arrangement the equilateral triangle is compelled to move only in constant relation to the periphery of the circle; the circle in the case of the engine-arm being the pulley over which the driving-cord passes, and because of the constant and uniform relation of the hinged angles of the triangle to the periphery of the pulley, in every possible position of the arm-joint the driving-cord is maintained at an absolutely uniform tension. The device here noted forms the basis of the system by which the three essential joints of the engine-arm, wrist, elbow, and shoulder, are produced. It is automatically compensating in all positions, no springs or set-screws being required for the purpose of maintaining uniform tension upon the driving-cord.



To properly report my clinic and demonstrate the system I want to impress upon the profession, would require a series of operations. We are *not merely mechanics*. We may use mechanical aids as a means to an end; so does the mother profession, medicine. But if I appreciate the acme of tooth-preservation, it has relation to dentine recuperation. In some of the soft-foil operations, doing service for thirty years and more, where I have made sections of these teeth, I have found the dentine beautifully calcified. Can we say this of the Webb and Varney school of operations? Now, I am forcibly impressed there is a reason for this. Those fillings were done with soft foil, and the same principle applies to properly made plastic work. The conditions under which these soft-foil fillings were made obliterate the fibrillæ by a deposition of calcic salts, converting them into secondary dentine, if I may use that term. If the dentine can thus change its character under mild treatment, why then resort to excessive mallet work? I think both systems of soft and hard foil are correct if put in their proper relations to tooth-structure.

The pulp of a tooth is of complex structure, yet, functionally, it is easily understood, no organ being so sensitive in its tactile impressions as the tooth. The pulp, with all its sensory fibrillar filaments through the basis-substance, should not be abused by mechanical treatment. If we put a tooth in acid, we can take away the lime-salts, yet the whole form of the tooth remains. Again, we can take away the animal matter, and the salts remain, but there is a condition excluded from all experiments, its vital principle, life. Should we not respect that condition above all else? From clinical observations and from records which I have kept I have learned to respect dentine, to treat it in accordance with nature, as nearly as art is compatible, endeavoring to harmonize the two, and I find that nature responds to that respect. Regulate the manipulations to correspond with dentine and enamel structure, instead of resorting to extreme measures of shock and more or less mutilation in packing gold as hard as gold can be made. Avoid that condition where it covers dentine. A fair porosity with perfect contact is best, and the enamel can receive the harder layer of gold. Dr. Black states that the greatest density of gold is about 18 specific gravity. I am not familiar with the different conditions of specific gravity other than as clinically related to thermal change and the principle involved in this report, but I think where the dentine and the gold come together the purpose is best served at a specific gravity from 12 to 14, and at the enamel contact from 16 to 18; gold packed in laminæ will favor the deposition of secondary dentine, making in service the ideal filling. In plastics the saving quality comes also from that condition of not hurting the dentine, the artistic results always being conceded. When you come to enamel you have a different structure, one that is intended for hard work, and you can make your gold as hard as it can be made.

In the formation of cavities, I endeavor to make them conform to the strongest natural cleavage of tooth-structure.

The fibrillæ radiate from the pulp-chamber to the periphery in all directions. The enamel-prisms follow that condition exactly. I was taught in operating in approximal cavities to always give them a dovetail form, looking inward, the idea being to better retain the fillings. I find that unnecessary. I have noticed that the buccal and lingual margins of cavities so prepared will, in time, assume a bluish color. My idea is that that part of the tooth becomes devitalized from its inability to receive nutriment from the circulation of the tooth. If instead of shaping it in that manner, the cavity is cut to follow the natural anatomy of the tooth-structure, you have not only the strongest margins, but every part of the tooth is supplied with nutrition. I lay stress upon the adaptation of a filling against the dentine, because its structure in contact must change. It cannot remain in an unnatural condition. If the fibrillæ are pounded and punctured, or simply exposed, in preparing the cavity, they cannot remain in that condition. They die or live, and either means change for the tooth. The most infinitesimal leakage will allow bacteria to come in and undermine the work. But if the filling-material comes in juxtaposition with the dentine without destroying the essential parts of the basis-substance in which life is the dominant principle, nature will come to the rescue. We often build better than we know.

Nature reproduces no organ in the body. It may cicatrize, that is as much as an organ can do for itself, and under proper manipulation that is what the teeth do. You say, how about devitalized teeth? Their usefulness depends upon the inherent strength of the tooth at the time of devitalization, and the anticipation of carious influence by perfect filling, and after personal cleanliness. Again, in regard to the form of cavities, they should be simplified by means of matrices. I have here a strip of planished copper, also one of German silver. I prefer the former, as it is stretchable. I do not like a matrix with which you cannot gain a little leeway. Copper will extend in the direction where the greatest force is applied. The idea is to convert all cavities of complex nature into simple ones by a matrix adaptable to all conditions, and fill with cylinders placed one upon the other on their long axes, and carried into contact under bibulous paper pressure, preferably cut into tape to correspond to the size of the cavity. In this way you cannot tip or draw away the gold, which receives the after condensing force as the filling progresses.

Where you have a tooth decayed on the palatal surface you do not want the filling to show on the labial surface ; ordinarily it takes an hour to perform an operation of that kind. By taking a strip of this material you can pass it round the teeth, particularly in young teeth, in and out alternately, and get considerable room, getting it into almost absolute juxtaposition with the tooth, saving a third of your time.

By drawing it around the teeth in the way I have described you have converted a complex into a simple cavity, so the boundary wall of the approximal surface is restored. With young teeth you will find it of great advantage, because you can run it in and out by pulling one tooth out and one back, thus gaining considerable space. In not over two per cent. of cases do I find it necessary to separate. I have equal use of both hands in operating, which may help me somewhat. This copper strip may be used in the cuspids and in the molars as a ribbon-matrix for plastics, but for gold I soft solder it into a band. Cavities that run through the palatal or break at the neck, including the distal or cervical portion, and yet are not broken down on the grinding-surface, can, by passing a strip of ribbon through them, and bringing it to the opposite side, so the cavity is open, be filled as a simple cavity. As a rule these cavities should be and are opened up as suggested by the late Professor McQuillen. In operating upon these cavities I use cylinders, and where the work is large I follow with crystal mat gold, and then with the foil folded into 32 or 64, or any number you wish. My preference is for the velvet cylinders and crystal mat gold made by The S. S. White Dental Mfg. Co.

A band matrix should never be wider than to reach the extreme bulbous portion of the tooth. The first application of the cylinder is placed in position with a pair of plugging pliers. Those I have been using for many years are of special pattern, bearing the initials of Henry Coy, showing how long they have been in use. After the first layer of gold is placed in position, I take bibulous paper, folded once or twice, and cut into strips or tape to correspond with the size of the opening of the cavity, and with flat curved instruments carry it to place. The pressure thus applied being general throughout the surface of contact, the cylinder must go in position. It must adapt itself to dentine ; that is what you want ; adaptability and moderate consolidation is all that is required in the main part of a tooth to preserve it. In the masticating surface, or an exceptional restoration of contour, you can use cohesive gold ; but in the main part there is no necessity for hard cohesive gold.

Sensitive dentine is the greatest bugbear to the profession. Nothing, I think, causes more severe strain and loss of nervous energy than to work upon sensitive teeth, and anything to relieve that is a blessing alike to the laity and our profession. I find by the use of warm air and the application of a coagulant we get improved results. Carbolic acid I believe is our best coagulant, because it leaves no stain. To add to this partial success in destroying sensitiveness, I am using after a coagulant a one per cent. solution of *arsenic!* I know, when I speak of applying arsenic for the destruction of sensitive tissue, that I am treading upon very critical ground; but for several years I have been using Fowler's solution in very sensitive cases, first very rarely, only in extreme cases; then I grew bolder. My method is to first dry the dentine, apply carbolic acid, then apply Fowler's solution, or a solution of one per cent. arsenious acid. That is about what Fowler's solution contains,—four grains to the ounce. I let that remain in the dentine for from one to five minutes, very rarely more than two minutes. When it is desirable to remove pigmentary deposits upon the teeth, I bathe the parts with iodin. Some time ago Dr. Francis wrote an article on cleansing teeth, and I was strongly attracted to the efficiency of iodin for its cleansing influences. From that time I gave it much attention, and I find carbolized iodin destroys nearly all the accumulated matter upon the teeth or in the cavities, at the same time annihilating all germ life. In regard to using this small amount of arsenic, I have not had one case in which I can trace a pulp being destroyed, or where even pulpitis has followed the application.

Dr. LITTIG. How long have you used it?

Dr. REGISTER. Four or five years.

Dr. SMITH. Do you apply it when the pulp is exposed?

Dr. REGISTER. No; but when it is nearly exposed. I should have impressed upon you that the use of it should be followed by an antidote. Ammonia and magnesia are excellent antidotes for arsenical poison, although not so good as salts of iron; but the iron will stain the teeth, and therefore I think magnesia and ammonia best. With the ammonia and magnesia no arsenious acid remains in the dentine. Thus you get rid of the pain considerably in one application. I do not find it destroys the dentine, as, upon the removal of temporary fillings, the sensitiveness is re-established. Repeat the application, if necessary, but be sure to follow up the after-treatment with the antidote. I am quite sure it will prove a great blessing both to patient and operator, resulting in no devitalized pulps.

The PRESIDENT. We will pass to the subject of the evening,—"Cataphoric Medication of the Mouth," by Professor William James Morton.

Professor MORTON. I need not say that I esteem it a great honor to have the privilege of talking to you on any subject; but I have a grievance against your president. You know his suave manner better than I do; he told me he had a series of questions, and if I would come here these questions would be asked me, and I would answer them. But now he informs me that I am expected to present a general idea of cataphoresis in dentistry. I must say that I am surprised; but I will also say that I will endeavor to present as much as possible of the subject in the limited time that we have.

One reason for my coming here without extensive preparation was that I have been drawn off into this new Roentgen ray, which has entirely obliterated cataphoresis from my mind. Some few weeks ago I seemed to be an enthusiast on cataphoresis, and I had the pleasure of making some remarks on the subject; but since the Roentgen ray came, I have forgotten everything else; so I shall ask your indulgence to-night.

The Roentgen ray may prove of great interest to the profession. No scientific point has ever seized the human mind more deeply than this. The invention of the Bell telephone caused no excitement compared with it. It is probable we shall get great advantages from it. I said I would mention the subject before starting upon cataphoresis. It is simply one of those invisible forms of ether vibration, probably. I say probably, because the nature of the ray is not known to us. We know some of the forms of radiation of energy which we call, respectively, light, heat, and electricity; but what this form is is as yet unknown, and up to this point no reasonable explanation has been offered.

But it is probably true in this case that there is a ray of vibration of the ether,—a form of radiant energy that penetrates most substances, but fails to penetrate others; and it simply comes to this, that the penetration by this ray is merely a question of the relative density of the thing that is placed in front of it. The ray goes as straight as a bullet from a rifle. It is not reflected nor refracted, and cannot be thought of in the sense that light or heat is thought of; but the ray goes straight on to its mark, or it fails to get there, and the things that stop it are things that have density. Metals have density; so have bones, and teeth, and various substances of that nature. Therefore it will be of great use in surgery. If I hold my hand before a ray of light, you see a shadow on the wall; if I hold it before the Roentgen ray, it casts a shadow on the plate that will take the photograph. It does not make a black image on the negative; it does not affect the negative; you get the opposite effect, and you get a shadowgraph. When this thing first began, I placed my hand beneath one of my Crookes tubes, and exposed it about thirty minutes, and then developed the plate; and I assure you that for many years—not since I was a medical student—have I felt such a crawly sensation as when I saw my own bones, bereft of their flesh, on that plate. My hair felt as if it were rising. I had not previously seen my own skeleton, and I did not want to see it. That is what the Roentgen ray is doing, developing things that have been concealed within the human organism; and as far as teeth are concerned, if there is an encysted tooth, or if there are two or three unsuspected roots of a tooth, an exostosis, a fracture of the jaw, or any malformation, this ray will picture it on the plate in accurate outline, so that the dental surgeon can estimate the extent of the injury or the malformation. That has already been done in the bones of the hands and the feet. So in teeth these things may be located. There is no doubt about it, and so from this point there may be a considerable development of this ray in dental surgery. As for what remains in the future as to the possibilities of seeing into the internal organs,—of seeing the brain, the liver, the spleen, or the kidneys,—all that of course must be developed. So far as I am able to judge it does not seem to me possible that there is sufficient difference in the relative density of the organs to be able to outline them by aid of this thing. Whatever is less dense is not likely to be pictured.

But I must recollect that a far less interesting and exciting subject is before us, and that we must buckle down to work on what I think is a practical thing in dentistry.

You know that electricity is invading almost all the domains of human action. I see every time I come to a dental society how active an individuality is possessed in your profession. I do not know of any profession where I see that keen pursuit for what is novel, practical, and of real service, bereft of all theory, and I am always pleased with that absence of theory. This is one of those subjects which can be bereft of theory and can be made extremely practical. As much as you may be interested in new doctrines of dentine, in new instruments and engines, still here is a broad and general subject, whose applications to your profession are manifold. If you but once grasp a few general principles, these applications are open to you, and will present to you a broad vista of work. I may say that there is no application of a drug or medicine, or application of a fluid nature which you make to-day to teeth or gums, that may not be made (for better or for worse I will not yet say) more effective and more penetrating by the aid of electricity. What we mean in a general way by cataphoresis is that the electricity forces these drugs into tissue. Whether that tissue is dentine, gum, or mucous membrane, muscle, nerve, or bone, or any human tissue, the electric current behind the medicine that you are familiar with will drive it farther into that tissue and give better effects than if you did not use it. Will you wash a mucous membrane or the skin or dentine,—make a topical application of a certain drug,—or will you drive it in with electricity? If it is practicable, and does not cost too much, one would like to know how to do it. It is in the direction of that subject that I would like to spend a few minutes.

First, what definition shall we give to cataphoresis? The word is derived from the Greek—cata, "to flow," and phoreo, "downward." The old idea was that the positive potential is higher than the negative, and that the positive was up and the negative was down, and so it went from positive to negative. In a steady or continuous current, such as we call a galvanic current, there is a direction in its flow. That is not explained from an electrolytic point. It may also be said that there is a flow from the negative to the positive; but all the physical manifestations of electricity prove to us, from one point and another, that electricity for ordinary purposes flows from the positive to the negative. It is that law which is at the bottom of this question of cataphoresis. If you will remember that every medicine that flows into the human system must be put at the positive pole, and that it goes from the positive to the negative, you have a conception that is broad and practical.

If you see an apple or a stone fall, you have a conception of the law of gravity, so back of this we must have a conception. No doctor is a good doctor without a hypothetical conception, at least, of his case. A sluggish stream flowing on slowly, turbid and dirty, full of organic matter,—that is the human body. A mountain brook of clear and sparkling water, with a great hydraulic pressure behind it,—that is the electric current. As it rushes down and meets this turbid stream, it makes its way through it and you can trace its pathway. All our tissues are more or less semi-fluid. Even dentine has at least ten per cent. of moisture in it. The electric current can find its way through the dentine just as well as through a muscle. That stream is the electric current, and as it makes this movement across the turbid waters, that is cataphoresis. If you should go half a mile back and throw a barrel of lime or iodin, or anything else, into that stream, it will carry the medicine with it into the stream : that is cataphoric medication ; and if you discharge that same stream through an iron pipe, and the pipe becomes rusted by the electricity, that is the metallic electrolysis that I shall speak of presently. Cataphoresis may therefore be divided into the general principle, namely, that fluids move by the aid of electricity (and those fluids may be medicines), and into metallic electrolysis ; namely, that metals may be dissolved in the tissue, and when you have that conception you have the idea, and having the whole idea you may go to work.

There is at least time to say that this subject is old and new. It is like a foot-ball, kicked back and forth between one side and another, but never finding any definite lodgment until possibly to-day. It bids fair to find one of its first practical applications in the dental profession in the obtunding of sensitive dentine. It seems to me that that is practicable. Our historical records go back to 1833, when a Frenchman introduced iodin in this manner. Later we heard of it in Germany, and still later, in 1859, by Richardson, who used a mixture of chloroform and aconite which he put on a sponge on a dog's leg, and made the sponge a positive pole, putting the negative pole somewhere else. After ten minutes the dog's leg was numb, and he performed an operation on the dog. The reports of painless extraction of teeth always amaze me, because there are so many methods reported of getting teeth out without pain. I think many of these cases are hypnotism. Richardson dropped the matter because no one seemed to believe in it, and it dragged along until very modern times (about six or eight years ago), when Peterson, Edison, myself, and a number of others, took it up. Dr. Frederick Peterson wrote two or three interesting papers about cataphoresis.

I have said a few general words, but now we may say a special word about it. Most of us are familiar with osmosis. That principle of osmosis is one that is of great use in chemistry. It is a well-known fact that when two fluids of different density are separated from each other by a porous septum, the fluid of lesser density goes to the fluid of greater density. I represent it on the blackboard ; but this is the point where electricity comes in. You have a solution of less density, and it is slowly making its way through a layer of plaster of Paris, or bladder-skin, or what not, to the solution of greater density. You wait several hours, and you get your results. But put the positive pole into the compartment of lesser density, and you change the thing instantly. Electric osmosis or cataphoresis will take place in five to ten minutes, whereas it would take many hours by simple osmosis. The electric pressure is superior to the chemical pressure. In order to make these remarks most practicable we had better turn at once to what may be called the therapeutic applications of these principles. There we may divide off into certain lines, so as to keep our minds clear.

We have already become satisfied that there is a general principle of cataphoresis; in other words, that things flow along like a stream. It is scarcely probable that in dental applications this general principle would be of any practical value. In medicine it is of great importance in electro-therapeutic treatment. The general fact of making an application of the galvanic current is that fluids move from the positive pole and bank up around the negative pole, and people say that a positive pole is a dry pole, and a negative pole is a wet pole. If you stick two needles into a piece of meat, you can verify that for yourselves. The positive will stick and get quite dry, and the negative will get wet, and fluid will flow out at its location. That is exactly what happens in human tissue. If you can make applications of that general principle in oral surgery, you might like to do so. But when you come to cataphoric medication, and having these fluids useful to you, you have a good subject. When you come to cataphoric medication, you can do it in two ways. You can have your medicines in the shape of fluids, like iodin. The best way to use iodin is not to use an alcoholic tincture, but an aqueous solution of iodin. That is extremely penetrating by the aid of the electric current. You would use any of these solutions. That is one form of cataphoresis. The other is metallic electrolysis.

Under the heading of cataphoric medication you may do several things that are applicable in medicine, which I think may be used in dentistry. You may bleach teeth, and obtund the sensibility of dentine, and sterilize dentine. Those are three very important things to say to a practitioner. Take first the subject of the bleaching of the teeth. I cannot say that I know very much about that. I am not familiar with the past history of the subject. We know there are many things that will take the discoloration out of teeth, the discoloration being properly due to some decay of organic matter. One of those things has been the peroxid of hydrogen. Experiments have been made recently to bleach teeth with pyrozone. There is no doubt that if the peroxid of hydrogen can get hold of organic matter, it will do so and destroy it, and thus the discoloration will be removed from the tooth, if it is due to organic matter. If it were mineral matter it would be different. The point is to get this peroxid of hydrogen to go into the tissue of the tooth, and that is where cataphoresis comes in. You take an ordinary applicator of any sort, and put on the end of it some absorbent cotton, and dip it into the peroxid of hydrogen, or any medicine you use, applying the positive pole to the tooth, and leaving the negative pole anywhere; then the current is turned on gently, and the peroxid of hydrogen will enter the tissue with which it is in contact. The fluid externally applied is thus brought into an electric continuity of relation with the fluid in the dentine to which it is applied. I am not prepared to report any results from this principle of bleaching the dentine, but I will say that it is possible, and that it comes within the domain of this subject of cataphoresis. It probably will be worked out in fuller extent by some of you gentlemen.

Now, there is another branch of cataphoric medication, and that is the sterilization of dentine. Of that there is no guide or literature whatever, except that it is said to be possible. If you gentlemen recall the beautiful sections of teeth made by Dr. Miller and have seen the appearance caused by the microbes, you will know that it is important to sterilize dentine. That may be denied, but I do not think so. I should think it would be important to sterilize anything that had any morbid condition about it. If the dentine is accessible, nothing is easier than this same process. With the same applicator and cotton, the whole thing made a positive pole, the current turned on gently, the negative pole anywhere, as the current flows into the dentine it takes something with it which is a sterilizing agent. There is carbolic acid and chlorid of zinc, and perhaps sulfuric acid. Certainly peroxid of hydrogen. There are plenty of things to sterilize dentine which do not stain it.

Now comes that other branch, that of obtunding the sensitive dentine. There it seems to me is one of the most beautiful applications of cataphoresis to any branch of medical or dental work. I have had the pleasure of making a few experiments for some of you. In doing so, I was able to judge for myself of the extraordinary efficacy of the use of obtunding agents by the aid of electricity. The agent usually selected has been an aqueous or watery solution of cocain, but it may be some other agent. We know a twenty per cent. solution of cocain placed against dentine will not produce any anesthesia of great account, although it has been contended that it does, but I do not think the topical application is of any value. When you put electricity behind that application, in five or ten minutes' time, which is occupied in getting the patient used to the current and getting the process started, the sensitive dentine becomes numb, and, if the pulp-cavity becomes numb, the effect goes deeper down to the alveolar process and into the tissues at the apex of the tooth. That happens by putting electricity behind it. That is called obtunding of the sensitive dentine by cataphoresis.

When my attention was called to that, I recalled my early experience. I had made many applications with aqueous solutions of cocain. Here is an electrode for applications of aqueous solutions of cocain to the skin, and here is one of the more modern forms, as I have devised it, where there are perforations in the electrode to take up the solution. Here is an electrode that I have used for obtunding the sensibility of the skin in areas equivalent to the size of the electrode. Here is one three inches long and two inches wide, and if I put an aqueous solution of cocain in and turn on the current that the patient can bear, the skin becomes numb and I can operate on it. I thought when guaiacol was introduced I might use it, and I found that cocain was soluble in it. I found, on making applications, that in all these skin operations the guaiacol shortened the process immensely, so by combining these two anesthetics I found, as I said before, that I could cut down the time of the application, as compared with aqueous solutions of cocain, two-thirds, and that I could cut down the strength of the current even more, and with three or four milliamperes of current I can do as much with guaiacol as I could do with fifteen or twenty milliamperes without it. But guaiacol has not a pleasant smell. It is one of the derivatives of creasote. It is absolutely pure in color, and produces no stain. Eight or ten per cent. solutions of cocain in guaiacol will obtund sensitive dentine in five minutes so that the most sensitive cavity can be excavated without the slightest pain to the patient. I am not familiar with how far you gentlemen have proceeded with the obtunding of sensitive dentine with cataphoresis, so I wish to speak cautiously and in a general manner.

I hope this process of benumbing the pain of sensitive dentine is not failing to receive attention in your profession, because it seems to me you cannot afford to drop it without very carefully looking into the matter. It does not seem to be right to drop it now. I do not think I referred to the way that the subject grew upon the profession. I have been informed that Dr. Westlake proposed it at one time, and we all know the earnest efforts that Dr. Gillett put into the obtunding of sensitive dentine, the time he spent in getting instruments perfected, etc. So far as I am concerned, what I have done has been for the purpose of being of benefit to a brother profession, and I have no desire for any credit in the matter.

Now comes cataphoresis of mucous membrane. I have spoken of cataphoresis of the skin. I took an electrode of this size and put it on the skin of the chest of a doctor at the Post-Graduate School. In five minutes, with five milliamperes, I made it numb for three inches in length and two inches in width. A surgeon made an elliptical incision and removed a large tumor. If you can do that, you can certainly do lesser things, as with the dentine. Here is an electrode made at the request of a gentleman of the Post-Graduate School to use where the pain at the junction of the mucous membrane and the skin was most intense; this was to be moistened with blotting-paper and used the same as a skin electrode.

I find it is necessary to benumb the gums for the extraction of the teeth. That is perfectly possible and reasonable. It was outlined by Dr. Westlake, and perhaps somebody before him. I have a pair of tong electrodes here, which were made by Mr. Wheeler. You lay the positive pole on one gum and the negative pole on the other; the result, however, would be that one side would be numb and the other would not be, and therefore it was constructed from a wrong idea of cataphoresis, and it would only work one-half the way. It occurred to me to make a pair of electrode tongs, but they are different from these. The point was to make both blades of the tongs of positive polarity, and to get a ball-and-socket joint for adjustment. The gums do not adjust themselves to the instrument, and we had to get the instruments to adjust themselves to the gums. Both legs of the tongs, as I have said, are positive poles. Both sides of the gums and the whole vicinity come under the influence of the positive pole. If you put on guaiacol and cocain, or an aqueous solution of cocain, you get the entire gum benumbed. We tried it on a patient. It made the gums numb, but that was not all; when the tooth came out there was a wrench that was said to come from severing a nerve. The man said it hurt, and I did not like that. There was no doubt about the benumbing of the mucous membrane around the tooth, and I thought at the time if a cavity existed, I should take an applicator with some absorbent cotton and put it in the cavity, and then we would have anesthesia inside and out, and it would not hurt.

In regard to the use of guaiacol and cocain there is this point: Mr. Evans and I got up a solution which we called guaiacocain. It was a ten per cent. solution of guaiacol and cocain. I tried it several times, and Dr. Younger tried it. It made the gums numb, and he made some serious incisions and implanted teeth. These deep incisions could be made alongside the shrunken processes of the bone, and you could bore into the bone, and there was not the slightest expression of pain. The patients said they would rather have the electrical application in this way than by the needle. The applications by the needle are apt to produce toxic effects. The guaiacocain solution is not absorbed into the system. The reason is that the guaiacol holds on to the cocain. Take a dram of each, put them in distilled water, shake them well together, and then examine the water, and to your astonishment you will find that the guaiacol solution holds eighty-eight per cent. of the cocain, and only twelve per cent. goes into the distilled water.

Dr. NORTHROP. Are there any escharotic effects from the guaiacol?

Dr. MORTON. This guaiacol is a phenol, and a derivative from beech-tar creasote. It is not an objectionable feature as regards dentine, or as regards the skin. It is not corrosive nor escharotic, but it produces a certain effect upon the mucous membrane which it is well to obviate. Therefore it became important to dilute the guaiacol. I wanted to find a local anesthetic that would conduct electricity, and I could not find it. It is the cocain that makes the guaiacol conduct electricity. Guaiacol itself is an absolute non-conductor. I tried glycerol as a diluent, and that did not work very well; and finally I found you could dilute your guaiacol to any reasonable extent you pleased, and yet not detract from it, by using the oil of pine. It almost takes away the smell of the guaiacol. You can also use almond oil. I thought I could use glycerol, but I find that that property of the glycerol which attracts water unto itself is a great objection. Pure glycerol itself is quite a painful application. One can use oil of pine or almond oil or sweet oil to dilute the guaiacol and still not detract from it, so it practically cannot be said that the guaiacol is harmed by being diluted. If the mucous membrane is hurt after that statement, it is the operator's own fault. I have heard it said that it did hurt the mucous membrane. There are many things that do harm if they are not diluted,—whiskey, for instance, and strychnin, arsenic, and other things.

Metallic Electrolysis.

Now about metallic electrolysis. We have here a piece of copper or zinc, and make it a positive pole. I put a zinc needle into a piece of beef, and make it a positive pole. I let the current flow, and what happens? The positive pole is an acid pole, and the negative pole is an alkaline pole. The acids mainly are hydrochloric acid, muriatic acid, sulfuric acid, and phosphoric acid. Now there is acid, and oxygen and chlorin liberated at the positive pole. The oxygen combines with the zinc and makes oxid of zinc, and the chlorin combines with the zinc and makes chlorid of zinc, and the two combined make the double salt of the oxychlorid of zinc. You do the same with copper and it makes oxychlorid of copper, and the same with silver and it makes chlorid of silver, and so on. There are many of the metals which are thus soluble, so to speak. We used to be afraid of that attack on the part of the galvanic current, and we used to use gold and platinum needles, so the positive pole would not corrode the needle ; but now we want that corrosion, which is really a medicine manufactured out of that needle, but we also want the pushing power of the electricity to drive it into the tissue, and that is metallic electrolysis. All these instruments here are to be attached to handles. Here is a plain handle to which any of these bulbs may be attached for the different purposes for which they are to be used. They indicate how general these applications may be. You will devise different instruments as you need them, and these are only shown for comparison. Here is an instrument used for uterine diseases. Here is one that has been used for ulcerations of the rectum. It has a copper surface, and the positive pole makes oxychlorid of copper, and that enters into the ulcer by cataphoresis. In ulcerations, etc., of the mouth the application is the same.

In these cataphoric electrodes that I passed around to you there are a series of little drill-holes. That is to hold the fluids. Here is the handle of the electrode and the drilled platinum wire. [Illustrating.] It is plain enough to be seen on a large electrode ; but suppose it is only a bit of platinum wire that you put into a cavity. It was important to carry the same idea, so I made an applicator, the peculiarity of which was that in the end of it I drilled a hole so that it became a tubular applicator, and made a lot of cross drill-holes like a sieve. If you dip that into a solution, in the tubular drill-holes and in the cross drill-holes two or three drops of the medicine you wish to apply will remain. That same general principle goes through all the electrodes I have devised for cataphoric applications, and I have devised a great many. They all hold fluids, and it brings the electricity into contact with the fluids better than when they are flat, because the fluids fall away from the flat surface by pressure. If you have this drill-hole system that I have introduced into all my cataphoric electrodes, you cannot push it out.

To return to the instruments. You must begin with your source of electricity. That source may be the street current. It makes no matter whether you use the street current or a battery current, as long as you can handle it when you get it. Anybody can buy a thirty portable red acid cell battery, which will do this work. It is called a galvanic battery at the shops, or you can buy thirty or forty Leclanché chlorid of ammonia cells. They are used for the electric door-bells and the electric door systems, because they keep in order and are clean, and are very efficacious. There are many forms of the Leclanché cells. They can be bought of any dealer. You buy the individual cells, and you can put them in your closet or in the cellar or anywhere in your office. You can also have another system. You can buy storage battery cells, but you would have to buy quite a number to get the voltage you need, and I do not think that would be practicable.

If you buy fifteen or twenty blue vitriol cells, you could keep your storage cells charged. Your source of current, then, is some form of simple battery or the street current. I left the street current last for a reason. When you get it into the house, the trouble is to manage it. It comes in at one hundred and ten volts on a three-wire system, and if you put your finger on and complete the current, it is not pleasant. If you took one hundred and ten volts of a street current and touched a tooth with it, you would never see that patient again. It would give an attack of vertigo and dizziness. There are all sorts of ways to manage that current, and we call the apparatus for managing it a "rheostat." In medical work we have quite a number of good rheostats, because we do not use such minute currents as you use for sensitive dentine. You must have a very small current. We speak of volts ; that is only pressure, and that means electro-motive force, and electro-motive force means the motor force that is in electricity, and motor force is the force that is in anything that is going. There is no mystery about it. We also have a standard of measurement on which to act.

A man might take a million volts without harm. It is not that which does the harm, but it is the amperes and the volts taken together that do it. Water shooting out of a fire engine will knock a man down ; that is the ampere force. We are dealing with amperes when we do this cataphoric work. In medical work we cut them down into thousandths of an ampere, and we call them milliamperes. Medical work requires from five to twenty-five milliamperes. For special work we go up to one hundred milliamperes, but very rarely. Fifteen milliamperes is, for instance, what sends a message to Philadelphia on the telegraph wire. In dental applications on sensitive dentine, you use a fraction of a *milli*ampere. We do not think one milliampere is any current at all, but on dentine you must go below that. The trouble was to get a suitable apparatus. Dr. Gillett and Mr. Wheeler had a great deal of trouble in getting up between them a fractional volt selector. It is different from any rheostat that I know of. You can turn on three or four or forty cells, as you please, to secure the pressure you are going to work with, for it is not cells, but it is the volts you want. You must have a way to indicate your voltage, and that can be done with this instrument. You need a milliamperemeter to register the number of milliamperes, and a fractional volt selector.

Your president, Dr. Carr, when he proposed my being present this evening, very kindly got "Garretson's Surgery" and wrote out some questions, and I promised to look them up ; but I put the paper on a desk and forgot all about it. But here they are, and they will prove to be extremely interesting. They comprise the following topics : Hypertrophy of the gums, aphthous patch, cystic tumors—tongue, fatty tumors, ranula, solid ranula, sebaceous cyst, epulo-fungoid tumor, epulo-erectile tumor, cystic tumor of the mouth, odontocele, fibroma, and alveolar abscess. Many of those things will come under the domain of this treatment, and any questions that may be asked will, I think, bring out these things.

It would be better now for me to lay myself open to discussion, so to speak, and I will try to be answerable to you for a practical application of this principle of cataphoresis in a given case.

Discussion.

Dr. FREEMAN. How much metal is dissolved in your application?

Dr. MORTON. In a dermoid cyst, as large as an English walnut, in the course of treatment there was dissolved away one-third of the bulb, which is one-quarter of an inch long and one-sixteenth of an inch wide.

Dr. FREEMAN. Under what pressure?

Dr. MORTON. In that case twenty-five milliamperes in twenty minutes. The cyst never came back. The inside lining was so permeated with this oxychlorid of copper that it ceased its abnormal secretions, and by the inflammation set up the walls united. My point in these cases is to get the instruments where you want the work done. If it is a cyst, you must get into it. I take a knife and make an incision. Take guaiacocain solution and whatever size electrode is needed, and in about four minutes the part is absolutely numb. That being done, you take any suitable bulb and carry it into the incision. If it is a sinus, you carry it to the bottom of the sinus. Then you turn on the current, and if you are using chlorid of zinc, it is absorbed off where you wish to make the application.

Dr. PHILLIPS. Have you any rule that you follow as to the quantity of the metal you use in a certain place, or would you use your judgment?

Dr. MORTON. You get very expert with little experience. A lady came to me from the country, with large, heavy facial blemishes,—heavy moles, which were almost cartilaginous in consistence. She asked me if I could remove the moles, and I said yes. As you know, it is not a question of removing the moles, but a question of how much scar would be left. I asked myself how far could I go with the zinc. I would not like to go too far; but by using two milliamperes for two minutes with zinc, I know I have destroyed that part without getting a cicatrix of any account. The needle measures your current, but experience must teach you how far to go. I used two milliamperes for two minutes, and then another, and so on, until I thought they were sufficiently permeated to drop off without leaving an undesirable scar.

Dr. FREEMAN. What would you use in the formation of pus in an alveolar abscess?

Dr. MORTON. There are many men here capable of talking about alveolar abscess, and I do not know much about it; but say we have a cavity in the tooth, medication could easily be made to extend to that abscess.

Dr. FREEMAN. How about cutting through the gum to the apex of the root?

Dr. MORTON. After the cutting and drilling is done, I have here a nice little instrument for just that work. I have them in all sizes. They are insulated needle handles tipped with little copper zinc balls. Oxychlorid may be manufactured on the spot, and there is probably a great advantage in making it fresh. The nascent medicine combines most actively with the tissue. Nascent oxygen attacks almost anything it touches; nascent chlorin has a great affinity for hydrogen, and thus again sets free the nascent oxygen from H_2O.

Here is another interesting application: This is a needle that is hollow. It is a very good point to remember. You are making an application to some part of the gum, and you wish to dissolve off the copper. After a few minutes the chlorid of sodium in the adjacent tissue is exhausted. I take a little hypodermic syringe, and a hollow set of needles, and a twenty per cent. solution of chlorid of sodium, and as the tissue becomes exhausted of its chlorid of sodium, I feed down a little more.

There is a great difference between copper salt and zinc salt. The zinc salt is very corrosive, the copper salt not at all so. In an alveolar abscess, if I could get at it by way of the cavity, I would take the chlorid of zinc solution, and the electricity would drive it straight to the bottom of the tooth.

Dr. NORTHROP. What would be the effect through the apex of the root?

Dr. MORTON. I am not advocating the desirability of the treatment. I am only advocating the method, if you desire to pursue it. I do not know whether oxychlorid of zinc would be a good thing to use in alveolar abscess.

Dr. LEROY. What treatment would be indicated in necrosis of the alveolar processes?

Dr. MORTON. I do not know; I never tried it. Whatever medicine you use for necrosis you can use it, say, one hundred times better by driving it in with electricity. If you use sulfuric acid, you can do it much better. If you approach it with an applicator which is a positive pole, then that sulfuric acid penetrates to much greater depths.

Dr. FREEMAN. Does not your current break up the sulfuric acid?

Dr. MORTON. Not at all; that is a question that has caused much discussion. Cataphoric action is simply the driving power of electricity behind a fluid. When the currents are mild, the electrolytic action is at a minimum, and there is no decomposition of the fluid, and the cataphoric action still remains. I do not believe that cataphoresis and electrolysis have any physical relation, but we must admit that both are possible. The current would not decompose the sulfuric acid in any such strength as you use it. You can have electrolytic action without actual decomposition. That only occurs when the current strength is forced.

Dr. FREEMAN. Could you introduce the medicine into the soft tissues, the negative electrode being held in the hand, or on the face or neck?

Dr. MORTON. It would not make any difference where the negative pole was held. Held in the hand rather than upon the face, it requires more voltage at the battery; but no more is produced at the tooth.

Dr. FREEMAN. The reason I asked that was that, according to Dr. Peterson, the greater the resistance the greater the effect of your medicine.

Dr. MORTON. When you talk about the tissue resistance, you are wrong in one sense. Dr. Peterson's point that you referred to was that the thing that is being driven into the tissue by cataphoresis must have a fairly high resistance. As a curious experiment, I will take fifteen drops of sulfuric acid in a certain amount of water, and no cataphoresis will be produced, because the conduction is good; but if I took one drop, the cataphoresis would be marked. Chloroform, ether, and guaiacol are great non-conductors, and that is the reason you cannot drive them into the tissue, and therefore no sulfuric ether goes into the tissues. The discovery I made, and reported in the DENTAL COSMOS two or three months ago, was that, in order to make this class of non-conductors useful, you must add to them something in the nature of a good conductor. To make sulfuric ether a good conductor, you have only to add a salt of quinin or any other salt. Dr. Peterson's point is absolutely correct: that the thing must have neither too high nor too low a resistance. There must be resistance to have work done.

Dr. FREEMAN. The reason I asked that was that I am having holes driven into the arms of my dental chair, so the patient can lay the hands right on the arms of the chair and receive the current. The patient's disposition is to grab the chair, anyhow.

Dr. PERRY. Is the control of the ordinary current necessary as applied to cataphoresis?

Dr. MORTON. Yes; the nerve of the tooth is one of the most sensitive things there is about the human body. The slightest variation in the current causes pain. You must begin with a slight current—almost none.

Dr. PERRY. Is it just as easy to control it with the light current that you have in the house, as with the street current?

Dr. MORTON. Yes; thirty cells are equivalent, say, to about forty-five volts. With forty-five volts you would not need such a delicate apparatus as to control the street current. With the street current you must have a more accurate controller than with the battery current. I was astounded at the sensitiveness of the tooth to the electric current.

Some one asked about pyorrhea alveolaris, and in one of the experimental cases brought to my office I took a piece of zinc and at Dr. Rhein's suggestion I made a little spatula. It was quite a small thing, and was run down alongside the tooth. Cysts could be treated with the bulb process. I would advise you to begin with copper; it makes a greenish-blue stain, and in that way you can watch to a certain extent what it does. When you are familiar with copper, you can try zinc, which is far more powerful.

Dr. FREEMAN. I would like to make a statement here. In the use of cocain in sensitive dentine I first dry the tooth by compressed air or hot air; I desiccate the tooth, and then apply a twenty per cent. solution of cocain. In that way I get the results in about five or six minutes, where formerly it took me ten or fifteen minutes to get those results.

Dr. MORTON. Have you tried the guaiacocain?

Dr. FREEMAN. No; the odor was too much for me.

Dr. RHEIN. I would like to state that this instrument shown here is not like the one we used in the operation mentioned by Dr. Morton. We had a stiff rod of wire in a regular handle, about the size of an ordinary calculus instrument. It was simply hammered out and flattened,—an instrument that would go up around the palatal side of a root.

Dr. REGISTER. Do you think the application in pyorrhea has any effect in destroying the serumal deposits?

Dr. MORTON. I have had no experience in that matter. The question is merely, Do you use a salt of copper or chlorid of silver in pyorrhea? Is it useful to use those salts? If so, you can use them in the electric manner. The electricity enables you to use certain drugs by driving them in, that would not have the same effect if used topically.

Dr. Freeman. If your electrode is platinum, and you apply that to the positive pole, does it produce an acid reaction?

Dr. Morton. Yes; but that is electrolysis, not cataphoresis.

Dr. Freeman. Does that act on the deposit? Because all acids act on the deposits.

Dr. Morton. It is a mild acid, and may do so.

Dr. Pease. I would like to ask Professor Morton if the combination of the guaiacocain with the pine oil destroyed the escharotic action?

Dr. Morton. So far it has not been thoroughly tested, but the point I made is this, that the guaiacocain can be diluted to a point where it would have no detrimental effect on the gum.

Dr. Pease. At the clinic of the First District Dental Society, I understand that a patient on whose teeth it was applied returned the next day with his mouth in a very raw condition from the guaiacol. I thought I would mention that, so those present might be careful in its use.

Dr. Morton. What was it used for?

Dr. Pease. I understand for sensitive dentine.

Dr. Morton. It is only when it is used on the gums in full strength that it would produce that effect, and even in full strength it is not probably really harmful, but it is well to avoid anything of that kind.

Dr. Freeman. I wish to ask the doctor as to the escharotic effect of carbolic acid, or a solution of guaiacol and cocain,—if after that effect the cocain is not absorbed into the system? Is it not absorbed afterward?

Dr. Morton. I don't know.

Dr. Freeman. I made that statement because I was speaking to Mr. Evans, and he told me that after the escharotic effect of carbolic acid or guaiacol you have the solution of cocain absorbed into the system, and therefore you take the chance of a toxic effect of cocain.

Dr. Morton. There is no resemblance between guaiacol and carbolic acid, and you must not mix those two together. Guaiacol would not lose its hold on the cocain, except very slowly; and no toxic effect could follow, because of the prolonged time during which the cocain would be absorbed.

Dr. Freeman. I am speaking of the hypodermic injection.

Dr. Morton. There would be probably no escharotic effects in the hypodermic injections, but I have carefully avoided the subject of hypodermic injections, and adhered to the point of the cataphoric introduction of medicines.

Subject passed.

Dr. Perry. I think we should move a vote of thanks to Dr. Register for the great trouble of coming here with his appliances and engine, and operating for us under such great disadvantages. I also move a vote of cordial thanks to Dr. Morton for his very interesting talk to us.

Both motions were carried unanimously.

Adjournment.

John I. Hart, D.D.S.,
Editor Odontological Society.

SOUTHERN DENTAL ASSOCIATION.

(Concluded from page 254.)

SECOND DAY—*Evening Session* (Continued).

DR. R. C. YOUNG, Anniston, Ala., read a paper entitled "Can the Dentine be Reached through Systemic Treatment?" of which we give the following abstract:

In presenting this subject I have no new ideas to advance, but hope, rather, to be instructed by any discussion that may haply be called forth by this feeble effort upon a subject which has been most forcibly brought to my notice time and again.

That the human teeth do undergo structural changes must, I am sure, be a familiar fact to all of you who have had any lengthy association with these organs. Teeth that at one time are strong and dense, almost defying the keenest temper of an instrument, will at a later period appear soft and chalky, without any apparent derangement of the general system. Here I do not refer to pregnant women.

This condition is mostly associated with those who subject themselves to close mental application, straining to its utmost the working power of the brain.

I have been informed that among the upper class of the English, after a "season" spent in London, when these devotees return to their out-of-town homes to recuperate, their teeth are found to have undergone a marked deterioration; nor is this from neglect of them, for such people are not guilty of this sin; this same condition prevails among us in a greater or smaller degree, as the case may be.

I see now in my mind's eye two cases: one a prominent lawyer, whose teeth I have had in charge for some years; they were well developed, hard, and flinty, with but little caries. Some six months later to a previous sitting I found his teeth so markedly softer, with several cavities of decay, that I called his attention to this, asking of his general health and habits, both of which he assured me were as good as usual, only that he had been working very hard, eighteen hours a day, for the past three or four months; and we all know what close application for an ambitious, brainy lawyer means. The other, a young society lady, whose teeth were of a fair average quality, on her return home after a season spent in one of the gayest of our Southern cities I found that her teeth had softened to so marked a degree that she noticed it herself, and asked why this thing should be. In the city she visited, cistern water is used exclusively for drinking and culinary purposes.

In the public schools of Paris the children are made to study excessively hard; their teeth suffer from arrested development.

If, after long mental strain, the urine be examined, it will be found highly charged with the salts of lime (Flint). These may be drawn direct from the blood; perhaps so, or perhaps from the osseous system.

We know the teeth to be built of animal and mineral matter, we know the per cent. of each; but how they are combined or held together has never been made manifest. Certain it is not mechanical, and there is no known combination of animal and mineral matter; still we know the two to be held in close embrace.

True, the teeth must be considered perfect structures, never undergoing repair through any vital force, belonging to the same class as the hair and nails.

I cannot believe that such a perfect working-force as nature would ever develop an organ and leave it without further care. There must be a constant supply of nourishment passing to the teeth. The tubuli are filled with a clear fluid, and are the media which carry the nourishing fluid, drawing it from the pulp, and possibly from the cementum. Though this may be a very limited supply, it is as essential as it is limited, and must be rich with the principles necessary to the support of the organ.

I have tried through all available sources open to me to find an analysis of the fluid contents of the tubuli, but so far I have been unsuccessful.

Can we reach the starved dental tissues by administering through the alimentary canal to their wants? I think so. Now, you say they need salts of lime, phosphates, and magnesia, and unless these earthy salts pass first through nature's laboratory they cannot be assimilated, or that a hundred times as much as they need is taken through the regime of common diet. Let me quote you from a work of Garretson's:

"One thousand pounds of whole wheat grain contains one hundred and fifty-six pounds of muscular matter, twenty-five pounds of fat principles, one hundred and seventy pounds of bone matter. One thousand pounds of fine flour, one hundred and thirty pounds muscular, twenty pounds fat, sixty of bone principle. Accordingly the whole grain is one-half more nutritious than fine flour; it also shows the great proportion of bone material, that is earthy constituents, contained in the bran on less than seven hundred parts out of a thousand, or a little more than two-thirds of the whole. The weight of the bran, or outer coating, would therefore, in the common superfine flour, constitute the offal, weighing only five and one-quarter pounds to the barrel of flour, while the ordinary weight of offal is from sixty-five to seventy pounds. Now if we estimate the earthy constituents to be two-thirds of the offal or bran, we must consider that there is an actual loss of these important constituents which might be reserved in every barrel of flour of forty pounds.

"If we estimate a half-barrel a year to each child,—and this is only four or four and a half ounces per day, a very small allowance,—we find that the child is deprived of twenty pounds of bone- and tooth-forming principles, and this is done by the use of such flour as most families use; even the oatmeal, unless that of Scots, is deprived of its outer coating."

As an example or illustration of the want of nutriment principles in corn meal, I may here allude to the effects I have seen in the West Indies, where, in a dearth of provisions, corn meal was substituted. Corn meal, salt herrings, and fish were fed exclusively to them, and the effect was that the people lost all their natural strength, at the same time becoming fat and bloated, and inclined to dropsy. This was not the effect of inactivity, for the people were actively engaged in road-making and trimming hedges, consequently in healthy and exhilarating employment.

Domestic animals fed on corn get a sufficient supply of the mineral salt from hay, etc. Now, you see we do not get what we were intended to have, and, verily, a monument should be erected to the old miller in the story book, who "heated himself in grinding bones to mix with his flour, and so, through over diligence, he brought a fever on himself and died." Oh, blessed miller, why did you not leave a long line of your craft? I am firmly convinced that great benefit is to be derived from the administration of phosphate of lime in cases where we know it is needed, and if put in the stomach it will be assimilated whether it has gone through nature's laboratory or not.

Few people will eat brown bread, or the cereals, as nature intended, and the persons who need them most are generally the ones with little appetite; you might as well offer a sick person a pint of some decoction, or infusion, when better results would be had from a grain of the alkaloid of the required drug.

In the Dark Ages, persons were tortured most horribly by withholding chlorid of sodium from them; food of good quantity and quality was given them, but the salt withheld. Chlorid of sodium is not a product of nature's laboratory (in this sense), and yet is assimilated. Mercury, iron, and arsenic are not from nature's laboratory in the sense considered, still I don't think any one will doubt that they are assimilated; then why should not lime in the shape of lime-water, or phosphate from the syrup of the lacto-phosphate of lime?

I think a very happy compound, when our patients are run down and need a general toning up, will be found in syrup of hypophosphite of lime.

The discussion of the paper was, on motion, postponed until the next day, and the association adjourned.

Third Day.

Thursday morning was devoted to clinics, and the afternoon to an old-fashioned Georgia barbecue.

The association was called to order at 7.30 P.M.; the president in the chair.

Discussion of Dr. Young's paper.

Dr. J. Y. Crawford. I wish to emphasize one point in particular, in dental hygiene, and that is the importance of cleaning the mouths of patients as it should be done. It should be done thoroughly, from one end to the other. All diseased conditions should be removed. My suggestions usually do not receive unanimous assent, but I hope you will all unite with me on this point. The united indorsement of the whole profession on certain points would have great moral force, and would be far-reaching in carrying conviction to the public mind. We often come in contact with patients whose teeth are very dirty, and it is our duty, though not a pleasant one, to enlighten them on this point, especially those having the care of children; for it is of the very greatest importance that a condition of cleanliness should exist previous to the eruption of the first permanent teeth; that there should be no disease in the mouth at that time. I do not believe that the diseases of the teeth are contagious, but I do believe that there is in the septic matter lodged in diseased deciduous teeth that which induces decay of the permanent teeth, and therefore we ought to insist that our patients bring their children to us before the eruption of the first permanent tooth, that we may eradicate all disease of the mouth ; otherwise we will not be responsible for the future treatment of those children. If we would all unite on this stand, great good would result.

Dr. WRIGHT. It is my misfortune not to have heard the paper under discussion ; but I wish the last speaker had gone further, and said that we should in all cases clean the teeth before doing anything else for the patient, except, perhaps, some necessary extraction.

Dr. T. C. WEST. In the treatment of children's teeth the greatest trouble is to get hold of children in time to treat and clean their teeth. Parents as a rule keep them away from the dentist until they are actually suffering from the toothache. It is a continual surprise to me to see how ignorant parents are in regard to the eruption of the permanent teeth. I recently had a college professor in my office, and this subject came up. I asked him if he knew whether his scholars had tooth-brushes. He said he was ashamed to acknowledge it, but he had never given the matter a thought ! Within the last few days I have succeeded in interesting the principal of a girls' school in the matter, and she has invited me to talk to them on oral hygiene. I believe, if we could get our school-teachers interested in the matter, much good could be accomplished. My two little children come home and tell me what they learn in the kindergarten. They are much interested in what they are taught there ; and if the primary principles of oral hygiene were inculcated at that age, great benefit would result. For the higher grades it should be introduced into the text-books. I am working on that line in my town ; and I think, if each one of us would do what he can in that direction, beginning with the school-children, much good could be done.

Dr. R. C. YOUNG. We all realize the importance of the toothbrush and floss silk in removing remnants of food, etc., but I go a little further. Before cleaning the teeth I use the litmus paper, and show the patient the condition of the oral fluids. It is surprising to me in what a large proportion I find acid conditions,—not necessarily from the presence of food about the teeth, but often from conditions lying farther back ; perhaps after fevers—in one case after typhoid fever six months previous. Dr. Black says that all teeth have the same average per cent. of lime-salts, but I do not see how that is possible. I have seen teeth so hard that sparks would almost fly, under the instrument, and others that are so soft and chalky that I believe they would make a mark on a blackboard. I cannot believe that there is the same amount of mineral matter in teeth that vary so widely in character. It is not reasonable. We all recognize changes in the physical structure of the teeth,—teeth that are at one time dense and hard, are later found to be softened. What is the cause? The patient realizes the difference. A young lady recently came to me after a very gay social season. I found her teeth soft in structure. I put her on lime-water and the syrup of lacto-phosphate of lime, and there is evidence that it has benefited. It seems to be taken up and used in the dentine, restoring it to natural good condition. If the system can assimilate the lime-salts from the cereals,—nature's laboratory,—why not just as well from other sources? The lime-salts are the same. It is the duty of every dentist to get his patients interested in these things, and to educate the people. Make demonstrations, show them sections of a tooth, and let them recognize the different parts of a tooth. Show them the acid condition of the mouth as proved by the litmus paper. Then put them on Phillip's milk of magnesia, and after a few weeks show them the difference. It is our duty to antagonize these acid conditions, or our operations will be useless.

Dr. L. M. COWARDIN. I would like to hear the views of others on one point taken,—that the teeth are capable of retrograde metamorphosis through the circulation. I accept the statement that they may be hardened through the internal deposition of calcic salts; but when a tooth is found soft, it will be found hardest nearest the pulp-cavity. It softens from without inward, while it hardens from within outward. Under artificial conditions of diet and civilization we do find the teeth softened and wasting away.

I agree with Dr. Young as to the importance of testing the hygienic condition of the mouth, but the most important period in dental prophylaxis is at a period when the dentist is ignored. The amelification of the second dentition begins before we have any control in the matter; we cannot get at the child just about when it is born. Departures from normal diet often begin very early. The child cannot make normal teeth on abnormal diet. The stomach is stuffed every hour in the day, and instead of getting chops and eggs and milk it gets cake and candy. This is not normal food for tissue-building. Parents rely on their physician in these matters, and the medical profession must be educated so that we can get their support in the cradle.

Dr. YOUNG. If what I have described is not a physiological process, what is the advantage of dieting?

Dr. COWARDIN. To assist nature in building up the tissues, by furnishing the proper materials. This is physiological. Through the proper food we furnish the material for building up normal tooth-structure. But retrograde metamorphosis is another question.

On motion, the subject was passed.

Pathology and therapeutics being open for discussion, Dr. W. E. WALKER reported the following case. In the summer of 1895 a patient presented, a young girl of fifteen, who had only been to the dentist once before, having had, in the winter of 1893–94, eight cavities filled, some with gold and some with cement.

She had lived a free, healthy life in our seashore town until last winter, when she was confined in a New Orleans boarding school. This summer I found secondary decay around two of the gold fillings and forty-seven new cavities, making forty-nine cavities, which I filled with gutta-percha and oxyphosphate. None of the cavities were very deep, but presented the characteristics of what is known as "rapid white decay"; the teeth were also very sensitive.

She is growing rapidly, and does not appear to be as strong as before she started to school. I put her on Phillip's milk of magnesia, with instructions to continue it while at school this winter. I am at a loss to understand the reason for such rapid destruction of her teeth. With her new school-life there was, of course, more mental activity than she had been accustomed to, with less outdoor exercise.

There had been no "midnight suppers," though she tells me that the time allowed in which to retire was so short that she could never brush her teeth at night.

Dr. S. C. G. WATKINS. Nervous strain is one of the remote causes in such cases. Dr. G. H. Winkler, of New York, a gentleman whom you well know and in whom I have all confidence, who is not one to be run away with by theories picked up on the highways and byways, has recently published a paper on the remarkable results obtained by the use of kreosotum (the homeopathic preparation) in just such cases. After its administration he has found but two or three cavities where before he would have expected thirty or forty.

He is enthusiastic in his belief in this remedy, especially in cases of rapid decay, and where the gums are hypersensitive and the saliva ropy. It is given for a certain time, then stopped, and then repeated. After a few weeks the mouth will be as sweet and clean as that of a new-born babe.

Dr. B. B. SMITH. It is a notorious fact that persons coming to Florida from remote sections of the country, California, Maine, etc., find that their teeth decay very rapidly. We have not located the cause; there is not necessarily any change in diet, for they can eat as they choose. Is it the climate or the water? The fact cannot be disputed that change of locality has this effect.

Dr. C. L. BOYD. Persons going to New Orleans have complained of the same thing, and attributed it to change of water and diet. I have seen similar cases, though not so rapid and extreme.

Dr. FRANCIS PEABODY. In June of this year a lady brought me her daughter, fifteen years of age, to ask advice in regard to correcting a case of irregularity of the superior teeth; having examined the mouth and given an opinion, she requested me to see her physician and learn something in regard to the history of the family. The physician came the next day and stated that "the case was one from syphilitic parents; the child was one of twins, the other having died a few weeks after birth from syphilitic poison. This one had been covered with humors, and had had a severe and prolonged attack of rhinitis; she had but two teeth in front where there should have been four; that the pinched and contracted appearance of the upper lip was due to want of development of the superior maxillary bone," and then made the statement that "such cases always have a syphilitic origin." This remark caused deep reflection, and the thought came to my mind, If the want of development is caused by syphilis, does the same disease cause over-development? and if the failure of the germs of the lateral incisors to take their natural position in the arch was due to this same disease, what a number of people had been unfortunate in their forefathers; and I called to mind one case within my knowledge where the grandmother (a lady whose character was above reproach) never had erupted the left lateral incisor, and the daughter (equally pure and spotless) was lacking the same tooth; and the grandchild of this same daughter failed to erupt the left deciduous lateral incisor (the only case that has come under my observation), and the permanent left lateral has also failed to appear, and the child is eleven years of age.

The case in question, on examination, presented the following appearance: a generally contracted arch, both lateral incisors being absent; the anterior teeth shutting fully one-quarter of an inch within the arch of the inferior; the first molar (the second not erupted) closing on the inner half of the lower second molar; second superior bicuspid closing on the inner half of the lower first molar; all the rest of the teeth closing within the arch of the inferior teeth, but being too short to occlude were they in their proper position.

An elevation within the vault of the superior maxillaries on either side, extending from the cuspid as far back as the second bicuspid, would suggest the possibility of the missing laterals lying transversely beneath the bone.

The young lady is quite handsome, with the exception of the dished appearance of the upper lip, and a weak, childish voice would indicate a stoppage of the nasal and laryngeal passage. She has always been a mouth-breather. An examination of the posterior nares discloses an adenoid growth in the naso-pharynx the size of a small hickory-nut; this of course obstructs the posterior nares, and renders nasal respiration difficult. The nasal septum is deflected to the right, and on the same side are ridges which still further narrow this channel. The inferior maxilla is normal in size and shape.

There are two questions of interest in this case, which I trust will be fully discussed:

1. How far is syphilis a factor in the want of development of the superior maxillary bones?

2. Can the maxillary bones themselves be expanded, and to what extent? Can they be expanded or pressed out anteriorly and laterally, or either way?

I fully appreciate that had the child been treated at the age of nine or ten years, it is probable that the arch would, by proper and persistent pressure, have been considerably developed; but whether the alveolus and the maxilla, with most of the teeth in position, can be enlarged, is the question that is presented.

A split plate, with a jack-screw turned up twice a week until the soft tissues covering the vault were blanched from the pressure persisted in for six weeks, has produced little visible result further than pressing the bicuspids far out beyond their normal position. This pressure has so far only been exerted laterally, and the jack-screw, a very short one, has been placed at the highest practicable point.

The other cast which is here presented is a case of over-development. This case can very readily be reduced, and is only shown as being in marked contrast to the one under discussion.

The Committee on Voluntary Essays reported the following paper by Dr. A. M. Scott, of New York, upon

THE TREATMENT OF ORAL ACIDITY, LOCAL AND SYSTEMIC.

In asking your attention to conditions of the oral secretions, I am conscious that the limits of a paper are quite inadequate for more than a general consideration of the subject.

As a consequence of certain nutritional disturbances, abnormal systemic conditions, functional perversion of the gastro-intestinal tract, or from local causes, the oral fluids of a large percentage of persons applying for dental treatment present an acid reaction usually so pronounced that the integrity of tooth-structure and associate parts is threatened, or there already exists evidence of positive injury.

The epicure, the dyspeptic, and the habitual partaker of sweets, sour wines, and milk or fruits, at or between meals, exhibit hyperacidity of the oral fluids.

In patients during severe illness, or when the chlorid of iron or the mineral acids are administered, in the gouty and rheumatic, and, as is well known, during pregnancy, the reaction of the oral fluids is not unfrequently acid.

You have had occasion to observe the decalcification or chemical erosion (a molecular breaking down of the tooth-structure), marked by a roughening of the enamel, and rendering the tooth painfully sensitive alike to touch and exposure to sudden thermal changes. This condition has an especial tendency to undermine and partially destroy fillings which extend to the gum, and is frequently observed in patients of the so-called gouty diathesis (evidencing a hyperacid condition of the saliva), and in chronic inflammation of the gingival margins of the gums, whether resulting in erosion of the teeth or not. Such results of acid states of the oral secretions have always been discouragingly difficult to treat.

It is not my purpose to elaborate upon the probable etiology of such acid conditions. I shall have, however, something to say regarding the several methods of dealing therewith.

A patient comes to your office complaining of excessively sensitive teeth. You examine the mouth and find one or more of the several things,—there may be an erosion of the enamel, or a recession of the gums, or unmistakable evidence of food particles undergoing fermentation, or again you may see teeth with and without cavities but extremely sensitive. So the question arises, how are we to know positively that the saliva is of acid reaction? In his work the chemist uses litmus to indicate the presence of acids in solution, and the dentist must do likewise. Right here I must emphasize—the application of a strip of litmus paper will often solve an otherwise very knotty problem. Of course, if we have an erosion, we know there is acid present, and that we have to deal with acid sodium phosphate.

To combat and minimize the ravages of oral acidity the use of some non-corrosive alkali is naturally suggested, and chalk, calcined magnesia, bicarbonate of soda, lime-water, etc., have been employed, but always with indifferent results. Their acid-neutralizing action is only transient, and all have other objectionable features, the chalk and calcined magnesia being gritty, irritating, and insoluble, while the soda bicarbonate and lime-water, though without grit, are even more transient in action; besides, they are all anything but pleasant to taste.

In looking over the chemical field, among non-corrosive alkalies our attention is attracted to magnesium hydrate, which is an exceedingly powerful antacid, but perfectly tasteless. I take for granted that every progressive and conscientious practitioner is interested in anything possessing superior advantages and offering greater certainty of results than methods hitherto employed. So far as my knowledge extends, there is but one form in which magnesium hydrate is obtainable suitable for our purpose. It is a preparation known to the profession as milk of magnesia (Phillip's). A careful examination of it chemically shows it to be pure MgH_2O_2, odorless and tasteless (barring the slightest astringency), in fluid form, and absolutely free from grit,—a microscopic examination under 500 diameters presenting a perfectly homogeneous field.

It is not subject to precipitation, but maintains a milk-like consistence, and contains neither gum, starch, glycerol, nor other suspending or emulsifying agent; is not even a chemical by-product, but simply water and magnesia, representing twenty-four grains of hydroxid of magnesium in each fluidounce of distilled water.

Inasmuch as there are present no odor, no grit, and no unpleasant taste, the patient cannot only use it without inconvenience, but we are positively assured that it will not nauseate or disgust the most fastidious.

Regarding its strength as an antacid, I find that it will neutralize an equal volume of fresh lemon-juice, and, like all other hydrates, it has the greatest possible chemical affinity for acids. A teaspoonful taken in the mouth and allowed to float around over the teeth will not only thoroughly neutralize any acid present, but, owing to its peculiar clinging, semi-gelatinous nature, there is left on the teeth a slight alkaline film, which is sufficiently adherent to protect the tooth surface from acid action for a considerable time. In fact, I have tested the reaction of the saliva with litmus three and four hours subsequently to the application, invariably finding it still marked by alkaline. Lime-water will retain an alkalinity in the mouth ordinarily about fifteen minutes, bicarbonate of soda solution about twice as long, chalk somewhat longer; but a gritty powder is naturally so very objectionable to an already sensitive mouth that it is not to be compared with a tasteless fluid. Besides, any crystalline form is poorly applied by the ordinary patient, while the fluid magnesia, taken in the mouth, coats every part and particle of the teeth without any care necessary on part of the patient.

Individual cases will govern; but it is probably sufficient to prescribe its use, subsequent to cleansing the teeth, three times daily, always upon retiring, or it should certainly be employed night and morning. And so employed, one to two weeks prior to operating on teeth of poor structure (which are usually extremely sensitive), it renders this ordeal far less painful. In that form of dyspepsia characterized by a sour taste in the mouth, red tongue, acid eructations, and pyrosis, and aggravated by foods containing too much fat, the conjoined local use as a mouth-wash, with the internal exhibition of this form of magnesium hydrate, is attended with the most immediate and satisfactory results. Internally it will always prove of great value as a systemic antacid, in conjunction with local use, when oral hyperacidity is due to continued eating of acid fruits or the habitual taking of sour wines at meals, exaggerating a pre-existing tendency in this direction, or tending to pervert the normal, slightly alkaline reaction of the saliva.

Magnesium hydrate will neutralize in the most complete manner the acid particles in the mouth, which so often give trouble when taking acid medicines. In treatments where you are called upon to use acids of different kinds about the mouth, and desire to limit or counteract their action, it is prompt and most agreeable, notably with aromatic sulfuric acid, subsequent to the treatment of pyorrhea alveolaris by this agent. Many persons take a glass of milk just before retiring. Here its local employment is invaluable, in preventing lactic fermentation ; the conversion of the milk-sugar into lactic acid (induced by the heat of the mouth), if continued, frequently results in excessively sensitive teeth. The extreme sensitiveness of teeth caused by the attachment of partial artificial dentures, particularly when clasps are employed, will be markedly minimized when this agent is applied.

The importance of the care of the teeth during pregnancy cannot be overlooked or lightly considered,—that supersystemic acidity so provoking and distressing to the patient, and so frequently the prime cause of decay, when the teeth are kept constantly bathed with an acid saliva, and frequently flooded with acid regurgitations from the stomach. Such conditions are often viewed with alarm and but imperfectly controlled. Locally and internally employed in these cases, the magnesium hydrate has proven promptly effective and agreeable. But, what is most important, it affords positive immunity from the action of acids for a very considerable time.

It has been asked, "What is the film which is seen to coat the teeth after an application of magnesium hydrate?" Inasmuch as the magnesia exists in the condition of a hydrate and is a fluid, so being in the best possible form, both physically and chemically, for forming new compounds, it is considered that, after the excess of acid present has been neutralized, the remaining portions of the magnesium hydrate combine in a somewhat loose chemical way with the mucoid or albuminoid constituents of the saliva (which as a rule already coat the teeth), giving us an indefinite compound, which may be called magnesium albuminate.

Now, this being loosely combined, as soon as more acid is secreted and poured out from the diseased glands, enough of the alkali is liberated from the albuminous compound by reason of its greater affinity for the acid (which is usually acid sodium phosphate) to neutralize the acid present, such process going on until all the magnesia present is used up, which requires several hours, as above mentioned.

This, no doubt, accounts for the fact that the saliva remains alkaline several hours after application.

Gentlemen, permit me to say that the matter presented for your consideration is *not* theory. On the contrary, I could elaborate extensively from such material, but do not wish to encroach further on your time, only adding that as the range of acid conditions and consequences is wide, any agent competent to control such conditions and effects must have an equally broad field.

Subject passed without discussion.

The Clinic Committee made the following report :

Dr. W. H. RICHARDS, of Knoxville, Tenn., demonstrated his mode of loading lower rubber plates with low fusible metal, either for the purpose of making a new plate, for a much absorbed gum, stable by additional weight, or for restoring an old plate to comfortable service cheaply, or for prolonging the use of a temporary plate under which absorption has gone on rapidly, but not so completely as to demand replacement with a new one.

The new plate, after being finished in the usual manner, is oiled on the gum side, and is pressed into soft plaster which has been poured into a tin rim until the plaster covers all the surface of plate intended for contact with gum. After the plaster is set, raise tin rim until within one-eighth of an inch of its lower edge, then oil all the plaster surface within the rim; pour in plaster sufficient to fill the rim and cover the teeth; separate as soon as hard; cut a dovetailed groove in the center of plate over the ridge, in depth according to the amount of weight desired; also a gate from heels of plate to rim; place the parts together accurately, hold them in boiling water until the metal is melted, then pour, cool, and finish.

To restore an old plate or prolong the life of a temporary one, the same general instruction will apply, except a roll of wax, well softened, is placed into the groove occupied by the ridge. Place in mouth and require the patient to close the mouth until proper articulation is obtained. Remove, trim wax, and pour up plaster as before directed; wash out wax and cast metal, which will require some undercuts to retain.

Dr. M. C. MARSHALL, St. Louis, Mo., presented a new feature in bridge-work, having for its object the avoidance of the danger of fracturing artificial teeth. The method is applicable only to the teeth in the rear of the mouth. The artificial teeth are encased in a box frame, each tooth being enveloped in a gold casing which covers all surfaces excepting the buccal and occluding, and the teeth placed there are grasped by the gold box so that they cannot be pressed out. As a means of retaining these teeth in position, if they are put into the bridge while the bridge is in the mouth, he uses oxyphosphate of zinc; if they are placed in while the bridge is out of the mouth, he would prefer using sulfur as the cementing medium. The central idea of the specimens presented is that, in case of a fracture, a tooth can be replaced without removing the bridge from the mouth. The teeth are not subjected to heat, and there can be no possible check or fracture thereof. Another feature is that the gold grinding-surfaces heretofore thought necessary for the preservation of the teeth are entirely done away with.

Dr. P. W. ONDERDONK, New York, demonstrated the attachment of a Logan crown by means of a gutta-percha washer. The crown being properly fitted to the root end, and articulation properly obtained, his mode of attachment varies from the usual mode by the following process: He smears the root end with a varnish composed of rosin and chloroform; then he uses an instrument of his own devising for placing in position the gutta-percha washer; then having the crown covered with oxid of zinc, the crown being warm, forcing it into the gutta-percha, forming a perfect adaptation of the crown to the root end. Cementing the crown in position, trimming the excess of gutta-percha off, is the final stage of the operation.

Dr. E. P. BEADLES, Danville, Va., demonstrated the combination of cohesive and non-cohesive gold in an operation upon a central incisor, put in by hand-pressure exclusively, the operator standing in a perfectly erect position, using the mouth-mirror. The cavity was shaped without retaining-points.

Dr. W. T. ARRINGTON, Memphis, Tenn., made a filling in a molar approximal and crown compound cavity, with Abbey's No. 5 gold foil in combination with No. 4 tin foil, folding the ribbon with alternate layers of gold and tin, beginning at the cervix and folding the ribbon until the position where the cavity dovetails into the crown cavity was reached; then using annealed Abbey's foil, it was extended over and the crown cavity and fissures filled thoroughly under mallet-pressure, and polished up in the usual way.

Dr. L. E. CUSTER, Dayton, O., fused porcelain in his electric oven, and demonstrated the appliances for the automatic regulation of the same. The current used was the 52-volt alternating. The porcelain fused by this oven presents the appearance of perfect fusion, clearness, and strength, which is done with great facility. The instrument does away with the odor, noise, and gas; besides, it does not heat the room. The appliance is exceedingly simple, and can be worked by any one.

Dr. L. G. NOEL, Nashville, Tenn., reported his clinic as follows: "I had a number of children, giving me almost every variety of dental disease that is incident to childhood. In two cases I had decided irregularity in the arrangement of the teeth: one case that will be corrected by the extraction of one tooth; another case in which there will have to be a mechanical appliance made to straighten the tooth. I had also one case of toothache in a child about four years old, that had to be cured by extraction. The diagnosis of that trouble was uninteresting. In the cases of all these children, however, I directed my treatment to the oral hygiene, and in doing so I demonstrated a method of using tincture of iodin for loosening up the green-stain upon the teeth, destroying the microbic organisms, and as a means of reducing gingival inflammation, or inflammation of the gums. These children gave me a very fine opportunity to demonstrate the method of arresting decay on the approximal surfaces of their teeth, by liberal separation with the corundum disk, afterward treating the separated surfaces liberally with silver nitrate, which was applied upon a little wooden instrument,—a toothpick or match,—using powdered crystals. It was my purpose to demonstrate, also, the use of copper alloy in filling these approximal cavities when small. I recommend a repetition of the silver nitrate for several weeks, until the cavities are thoroughly blackened, then excavating and filling with copper alloy.

I also recommend copper alloy for cavities upon the grinding-surfaces of the deciduous teeth. These little patients afforded an opportunity of showing the evil effects of too early extraction of the second baby molars, as a cause of frequent irregularity in the arrangement of the permanent teeth.

Dr. W. B. FINNEY, Baltimore, Md., demonstrated his method of treatment of the following: double contour of the central incisor, extending across the cutting-edge; contour built down to natural shape of the original tooth. Done with instruments of his own design, and it is considered by all who examined it to be a great success.

Dr. C. L. ALEXANDER, Charlotte, N. C., demonstrated two new methods of his own invention: one a suspension denture, showing where lost teeth can be replaced without disfiguring or cutting off adjoining teeth, and without making any display of gold from the anterior aspect. The other a gold cast filling, which can be made in the laboratory from an impression taken of the tooth to be restored, thus saving the patient in many cases the fatigue of undergoing a long dental operation.

He also exhibited a disk mandrel of his own invention.

Dr. W. E. **Walker**, Pass Christian, Miss., exhibited three forms of a new articulator, demonstrating with casts of the natural teeth, first, that while models of the natural teeth will *occlude* in Bonwill's anatomical articulator, they will not so *articulate* as to permit the functional movements of "grinding" and "biting;"

That when placed in the position for biting, the molars, owing to the upward curve of the distal end of the interdental line (or line of occlusion), come in contact before the morsal surfaces of the incisors can engage;

That when placed in position for *grinding*, the longer cusps of the inferior molars (the lingual) strike the longer cusps (the buccal) of the inferior molars, on the side from which the jaw is receding, preventing the grinding function on the opposite side, the teeth being held apart by the contact of the cusps on the other side of the mouth, as stated; the principal defect in Bonwill's articulator being that that portion which represents the glenoid fossa is placed horizontally, or at a right angle to the part representing the ramus, being also at a right angle to the facial line, thus compelling the part representing the condyle to move horizontally forward, instead of on an incline of about thirty-five degrees to a horizontal line (when it is perpendicular to the facial line); this anatomical imperfection in the Bonwill articulator giving erratic movements and abnormal articulation, preventing the reproduction of the functional movements of the human mandible.

Second, demonstrating that the same models of natural teeth can, without any change in the plaster, be slipped out of Bonwill's articulator, and, on the same loops, slipped into the "Walker-Bonwill" articulator, where, while the occlusion will be exactly the same, the "biting" and "grinding" "articulation" will be as perfectly reproduced as in the mouth from which the casts were taken, because this articulator being anatomically correct throughout is also functionally or physiologically correct.

In this articulator the part representing the glenoid fossa has an incline of fifty-five degrees to the facial line, as in the average human skull, causing the condyles to descend on that incline as the mandible moves forward to the biting position, thus accommodating the molars and permitting the "biting;" while in the lateral movements, the condyle on the side from which the jaw is receding travels down on this incline as it is brought forward to throw the jaw to the opposite side where "grinding" is to be done, thus accommodating the long upper lingual and the long lower buccal cusps, which in Bonwill's articulator prevent the cusps on the opposite side from touching.

Third, demonstrating "Walker's physiological articulator," which has the incline of the part representing the glenoid fossa made subject to definite variations found in the incline of the roof of the glenoid fossa in different subjects, being provided with gauges to register the degree of the angle which this incline forms with the facial line. It is also provided with screws to correct the false positions of models representing the jaws in cases where the patient gives the wrong occlusion (or, as commonly called, "the wrong bite"), whether it be forward, backward, or laterally ; the articulator is also provided with millimeter gauges to register the action of these screws, thus permitting an exact record of each individual case, allowing the models to be removed from the articulator and laid aside for future work ; to make room in the frame of the articulator for other cases.

Fourth, showing a more complex form of "Walker's physiological articulator," designed not so much for use in the construction of artificial dentures, as for the study of the movements of the mandible. In this form there are adjustable pressure plates bearing against the distal surface of the ramus, causing the condyles to move forward in opening the jaws, all of the ramus below the point at which the pressure is exerted dropping backward exactly as it does in the human subject.

It is also provided with a set-screw to hold the jaws apart, which office is performed by the plaster casts in the other forms.

ALUMNI SOCIETY OF THE PHILADELPHIA DENTAL COLLEGE.

THE annual meeting of the Alumni Society of the Philadelphia Dental College was held March 4, 1896, at 3 P.M., in the college building, a large number of the alumni being present.

In the absence of President Henry McManus, Vice-President James McManus occupied the chair.

In a neat address, Dr. James McManus presented to the college a tastefully framed, bronzed plaster copy of the bronze bas-relief of Dr. Horace Wells which was presented by three hundred dentists of the United States as a memorial to the discoverer of anesthesia. An enthusiastic vote of thanks was returned to Dr. McManus. Interest in the subject being stimulated by the gift and by a paper read by Dr. A. P. Fellows, it was decided to solicit, through a committee, photographs of eminent members of the profession, with a view to the possession of a gallery of the same in the new college building about to be erected.

The following papers were read and warmly discussed :

"Conservatism in Crown- and Bridge-Work," Dr. Hayes A. Clement ; "How to Gain a Practice," Dr. A. P. Fellows ; "Aim and Concentration," Dr. H. L. Gilmour.

The election of officers for the ensuing year resulted as follows :

Dr. Leo Greenbaum, president ; Dr. Hayes A. Clement, vice-president ; Dr. Thomas A. Shingle, vice-president to represent the class of 1896 ; Dr. S. H. Guilford, treasurer ; Dr. Otto E. Inglis, secretary.

After the election of officers, the board of trustees visited the meeting and through General James A. Beaver, its president, returned suitable thanks to Dr. McManus.

In the evening the alumni banquet was given at the Hotel Colonnade. Addresses were made by Drs. McManus, Bonwill, Burchard, Guilford, Stellwagen, Boenning, Ward, Wycoff, Nones, Inglis, Finnerty, Shingle, and White. Dr. Leo Greenbaum acted as toastmaster.

OTTO E. INGLIS, *Secretary.*

WOMAN'S DENTAL ASSOCIATION.

THE fourth annual meeting of the Woman's Dental Association was held at the office of Dr. Mary H. Stillwell, 1718 Walnut street, Philadelphia, March 7, 1896; the president, Dr. Anna T. Focht, in the chair.

The result of the election of officers was as follows:

Dr. Elizabeth Davis, president; Dr. Maria T. Lasser, vice-president; Dr. Hannah M. Miller, recording secretary; Dr. Bertha Jarrett, corresponding secretary; Dr. Emily W. Wyeth, treasurer; Drs. Eliza Yerkes, Anna L. Leaming, Emily W. Wyeth, Martha B. Corkhill, and Mary H. Stillwell, executive committee.

Vice-presidents for the various states represented are:

Massachusetts, Dr. Mary Gallup; Rhode Island, Dr. Jennie H. Gallup; New York, Dr. Alice I. Ireland; Maryland, Dr. Fannie E. Hoopes; District of Columbia, Dr. Edith Jewell; Illinois, Dr. Hester Baker; Missouri, Dr Alice A. Graham; Nebraska, Dr. Cora G. Little; Wyoming, Dr. Sarah Gardiner; Colorado, Dr. Sara May Townsend.

Present membership, thirty-two.

EMILY W. WYETH, *Recording Secretary.*

◆

DENTAL COLLEGE COMMENCEMENTS.

INDIANA DENTAL COLLEGE.

THE seventeenth annual commencement exercises of the Indiana Dental College were held in the Grand Opera House, Indianapolis, Ind., on Tuesday evening, March 24, 1896.

The annual address was delivered by Judge W. P. Fishback.

The number of matriculates for the session was one hundred and fifty-seven.

Dr. G. E. Hunt presented the diplomas to the following graduates:

NAME.	STATE.
B. M. Ackman	Indiana.
P. D. Ballou	Indiana.
Jennie H. Becker	Indiana.
T. T. Brand	Ohio.
L. R. Booze	Indiana.
J. Q. Byram	Indiana.
R. M. Callaway	Indiana.
O. C. Carr	Michigan.
F. B. Cochrane	Indiana.
G. R. Conover	Indiana.
R. E. Culver	Indiana.
B. H. Edwards	Ohio.
A. F. Eiteljorg	Indiana.
W. M. Ellison	Indiana.
J. F. Gant	Indiana.
M. M. Gilbert	Indiana.
E. G. Glasgo	Indiana.
J. R. Harrington	Indiana.
Sara Harris	Indiana.
W. F. Huddle	Indiana.
E. S. Hunt	Indiana.
R. M. John	Indiana.
E. H. Kreis	Illinois.
W. M. Kunkle	Indiana.
M. E. Little	Indiana.
H. T. Locy	Indiana.
H. R. Martin	Ohio.
E. S. Miller	Indiana.
H. B. M. Nutt	Indiana.
Hiram Porter	Indiana.
E. G. Prall	Indiana.
T. C. Rutledge	Indiana.
W. P. Shortridge	Indiana.
M. V. Smith	Indiana.
J. W. Vance	Illinois.
C. C. Van Scoyoc	Illinois.
J. C. Vaughn	Indiana.
R. S. Viberg	Indiana.
W. E. Walker	Ohio.
H. D. Weller	Ohio.
G. N. Wickwire	Indiana.
V. V. Williams	Indiana.
T. J. Wilson	Indiana.

BALTIMORE COLLEGE OF DENTAL SURGERY.

THE fifty-sixth annual commencement exercises of the Baltimore College of Dental Surgery were held at the Lyceum Theater, Baltimore, Md., on Friday evening, March 20, 1896.

The annual oration was delivered by Rev. Edward H. Robbins, and the valedictory by E. F. Early, of North Carolina.

The number of matriculates for the session was two hundred and five.

The degree of D.D.S. was conferred on the following graduates by Professor M. W. Foster, dean:

NAME.	STATE OR COUNTRY.	NAME.	STATE OR COUNTRY.
F. D. Ashworth	California.	M. D. King	North Carolina.
J. B. Askew	Mississippi.	C. W. Motley	Virginia.
W. C. Ames	Virginia.	E. S. McIlvaine	Pennsylvania
A. R. Badgley	Ohio.	H. W. Murry	New Brunswick.
E. R. Baker	Pennsylvania.	L. S. McElrath	Virginia.
J. G. Broad	Pennsylvania.	P. J. McElrath	West Virginia.
W. W. Bruck	Germany.	R. S. Peabody	Connecticut.
A. D. Coale	Maryland.	W. J. Rolston	Canada.
C. F. Chandler	Alabama.	E. A. Stallings	Alabama.
L. E. Chevremont	Porto Rico.	F. Staton	North Carolina.
R. L. Carr	North Carolina.	J. B. Saxby	California.
F. C. Day	New York.	S. L. Syckes	Pennsylvania.
E. E. Erhart	Florida.	T. P. Sullivan	Massachusetts.
E F. Early	North Carolina.	W. C. Sprague	New Brunswick.
C. H. Fallon	New Jersey.	C. A. Thompson	North Carolina.
E. P. Fitch	Connecticut.	J. D. Tench	Florida.
J. N. Garlinghouse	New York.	A. C. Wall	Hawaii.
J. D. Haggerty	New Jersey.	C. A. Whitehead	North Carolina.
J D Hunter	New Jersey.	C. M. Wells, Ph.G.	Maryland.
M. Holmboe	Norway.	L. K. Walz	Virginia.
C W. Kammer, Ph.G	Maryland.	W. F. Wilkinson	New York.
H. E. Kelsey	North Carolina.	C. Zimmerman	Pennsylvania.

CLEVELAND UNIVERSITY OF MEDICINE AND SURGERY—DENTAL DEPARTMENT.

THE annual commencement exercises of the Dental Department of the Cleveland University of Medicine and Surgery were held, in connection with those of the Medical Department, at Association Hall, Cleveland, Ohio, on Tuesday evening, March 24, 1896.

The number of matriculates for the session was twenty-three.

The degree of D.D.S. was conferred on the following graduates:

NAME.	STATE.	NAME.	STATE.
Thomas W. Blanton	Ohio.	Hoyt M. Lance	Ohio.
Joseph S. Ewald	Ohio.	George H. Ormeroid	Ohio.
Frank S. Hunter	Pennsylvania.	Edith N. Sloan	Ohio.

PHILADELPHIA DENTAL COLLEGE.

THE thirty-third annual commencement exercises of the Philadelphia Dental College were held at the American Academy of Music, Philadelphia, Pa., on Thursday, March 5, 1896, at 12 o'clock M.

The address to the graduates was delivered by Professor S. B.

Howell, M.D., D.D.S., and the valedictory address by Charles N. White, D.D.S.

The number of matriculates was four hundred and nine.

The degree of D.D.S. was conferred on the following graduates by Ex-Governor James A. Beaver, president of the board of trustees :

NAME.	STATE OR COUNTRY.
T. B. Ackley	Pennsylvania.
Frank G. Baldwin	Connecticut.
L. Chas. Bechtle	Pennsylvania.
M. U. Boatwright	South Carolina.
L. P. Bourgeois	Louisiana.
B. C. Brock	Iowa.
Frederic A. Brosius	Germany.
Arthur E. Brown	Canada.
Wm. E. Bryce	Canada.
Ellen R. Carr	Connecticut.
W. J. Carney	West Virginia.
Horace P. Carty	New Jersey.
Arthur W. Chance	Oregon.
Chas. B. Cock	Texas.
J. Fred. Colomb	Louisiana.
W. M. Conn	Canada.
C. S. Copeland	New Hampshire.
T. F. Cottingham	Delaware.
S. P. Courtney	Pennsylvania.
F. E. Cravath	New York.
Jas. A. Crawford	Pennsylvania.
F. G. Crispin, Ph.G.	Pennsylvania.
Wm. H. Cummings	Massachusetts.
Thos. M. Daniels	Massachusetts.
Otto O. Davis	Pennsylvania.
A. B. Davis	Massachusetts.
P. P. Dorr	Iowa.
John J. Dwyer	Massachusetts.
Chas. E. Ellegood	Massachusetts.
John P. Erwin	New Jersey.
F. H. Espenschade	Pennsylvania.
J. Kurtz Eyler	Pennsylvania.
Bryon M. Fell	Pennsylvania.
Jas. A. Finnerty	Pennsylvania.
Geo. N. Fry	Pennsylvania.
W. P. Galloway	Iowa.
W. A. Gamble	Pennsylvania.
Leon K. Glusman	Russia.
Arthur T. Glew	Canada.
B. C. Green	Illinois.
E. J. Griffin	North Carolina.
Henry C. Guldin	Pennsylvania.
Ernst K. Gyllang	Sweden.
Ezra Y. Harrison	Pennsylvania.
H. R. Hauenstein	Mississippi.
Homer Heberling	Pennsylvania.
Emil L. H. Herbst	Germany.
Ferd. Hinckley	Washington.
Clarence E. Holt	Maine.
J. Pedro Horcasitas	Mexico.
C. G. Hughes	Pennsylvania.
L. D. Johns	Wisconsin.
H. Furman Jones	New Jersey.
J. Edward Jordan	Pennsylvania.
Wadea Kassab	Syria.
Wm. Kay	Scotland.
Wm. Kiesau	Iowa.
R. De Vere King	Pennsylvania.
Wm. H. Kelly	Pennsylvania.
Wm. A. Knapp	Connecticut.
J. Oscar Laird	Iowa.
H. H. Lamb	Canada.
W. J. Leattor	Pennsylvania.
Harry F. Lotz	Illinois.
Melvin Markley	Nebraska.
E. Leslie Mason	Maine.
Albert L. Miller	Pennsylvania.
Robert M. Miller	Massachusetts.
Oswald S. Mitivier	Massachusetts.
John E. Morgan	Kansas.
W. G. Murray	Canada.
Joseph M. Myers	Pennsylvania.
John F. McCue	Massachusetts.
Thos. J. McLernon	Pennsylvania.
J. E. McMillan	California.
Richard Nash	British Columbia.
H. L. Patterson	Canada.
Gray B. Perl	Texas.
James L. Peak	Missouri.
B. W. Percival	Massachusetts.
James D. Price	Pennsylvania.
Robert S. Rendall	California.
Sidney J. Rauh	Ohio.
Roy R. Ridgely	Illinois.
J. S. Robertson	Australia.
Fred. L. Rounds	Massachusetts.
C. L. Russell	Pennsylvania.
H. E Sangster	Canada.
J. Schleppegrell, M.D.	South Carolina.
A. J. Shanacy	Canada.
T. A. Shingle	Pennsylvania.
H. S. Skidmore	New York.
A. F. Slater	Massachusetts.
Edbert A. Smith	New York.
Frank R. Smith	New York.
George S. Smoyer	Pennsylvania.
Welcom C. Snover	Pennsylvania.
G. H. Sweet	Canada.
William J. Taylor	Canada.
O. D. Trutt	Pennsylvania.
William S. Teller	New York.
Chas. B. Twitchell	New York.
Benjamin L. Tyler	Pennsylvania.
W. M. Van Atter	Canada.
G. Van Antwerp, Jr.	Alabama.
W. L. Van Buskirk	Pennsylvania.
W. W. Vanderhoof	New York.
J. A. Wark	New York.
John D. White	Washington.
Charles N. White	New York.
J. Van Wilson	Pennsylvania.
J. E. Woolverton	New Jersey.

PENNSYLVANIA COLLEGE OF DENTAL SURGERY.

THE fortieth annual commencement exercises of the Pennsylvania College of Dental Surgery were held at the American Academy of Music, Philadelphia, Pa., on Thursday evening, April 2, 1896.

The address to the graduates was delivered by Professor C. N. Peirce.

The number of matriculates for the session was three hundred and forty-two.

The degree of D.D.S. was conferred on the following graduates by I. Minis Hayes, M.D., president of the college:

NAME.	STATE OR COUNTRY.
Francesco Ardella	U.S. of Colombia.
Rafael Alvarez	U.S. of Colombia.
R. S. Anderson	Pennsylvania.
W. E. Askin	Pennsylvania.
Eugene C. Baughn	Pennsylvania.
J. E. Beatty	Pennsylvania.
M. Y. Belber	Pennsylvania.
Leon Bernstein	France.
L. H. Berger	Pennsylvania.
Mary E. Blake	Massachusetts.
L. L. Bosianu	Roumania.
John A. Bothwell	Canada.
C. A. Bolton	Pennsylvania.
Geo. J. Brown	England.
Geo. S. Bryson	Massachusetts.
H. P. Braham	Pennsylvania.
J. D. Burley	New Hampshire.
N. P. Bugbee	Vermont.
J. W. Carter	Pennsylvania.
E. D'Arcy Cannon	Chile.
Howard Clymer	Delaware.
Fannie Crouch	Pennsylvania.
T. G. Crymes	South Carolina.
J. L. Day	Canada.
W. E. Darling	Connecticut.
J. H. Drexler	Pennsylvania.
R. J. Eccles	Pennsylvania.
Wm. Ehni	Connecticut.
W. J. Elder	Ohio.
Mark J. Emlin	New York.
W. A. Eynon	Pennsylvania.
Percy Farrar	Connecticut.
Albert Frank	Pennsylvania.
Angela Folkmann	Austria
Albert Funke	Pennsylvania.
F. W. Glass	Pennsylvania.
T. A. Hart	Canada.
B. A. Hart	Ohio.
H. S. Haslett	Pennsylvania.
Chas. F. Healey	Vermont.
Clark V. Hile	Pennsylvania.
H. J. Horner	Pennsylvania.
W. A. Horner	Pennsylvania.
A. Tate Hoffman	Pennsylvania.
T C. Hosterman	Pennsylvania
Geo. F. Hummel	Pennsylvania.
John Hurdis	New York.
E. E. Huber	Pennsylvania.
G. F. Huntingdon	Canada.
W. K. Ingram	Nicaragua.
W A. Jaquette	New Jersey.
Hedwig Kette	Germany.
L. F. Keating	New York.
E. W. Klingensmith	Pennsylvania.
Alfred Krouse	Nicaragua.
S. H. Langstroth	Canada.
Rosa Liefshitz	Russia.
Geo. H. Martin	Massachusetts.
Geo. C. Mathison	Canada.
W. B. Maratta	Pennsylvania.
Wm. McIntosh	Canada.
W. P. McIlroy, M.D.	Pennsylvania.
D. McAlister	Pennsylvania.
F. S. McGannon	Canada.
S. McMurray	Pennsylvania.
J. S. Mullin	Pennsylvania.
H. R. Nehrbass	Wisconsin.
H. N. Osler	Pennsylvania.
J. B. Pardoe	New Jersey.
Carlos J. Peralta	Costa Rica.
W. Peters, M.D., D.D S.	Germany.
Herman T. Plass	Pennsylvania.
M. Rebecca Rauch	Pennsylvania.
G. C. Roder	Louisiana.
G. A. Roberts	Canada.
A. P. Rogers	Canada
C. C. Robinson	New York.
R. A. Rohrer	Pennsylvania.
F. P. Rutherford, Ph.G.	Pennsylvania.
S. V. Santz	Pennsylvania.
C. D. Scholl	Pennsylvania.
John A. Scott	New York.
E. T. Sherman	Massachusetts.
Chas N. Smith	Pennsylvania.
R. H. Speare	Canada.
D. G. Stewart	Pennsylvania.
E. A. Theller	California.
W. M. Thompson	New Jersey.
C. M. Tocornal, M.D.	Chile.
E. M Treat	Pennsylvania.
C. F. Vaughn	New Jersey.
F. F. Westwood	New Jersey
W. Whitelaw	Canada.
T. T. Wilkeson	North Carolina.
W. J. Willoughby	Canada.
J. H. Worthen	New Hampshire.

VANDERBILT UNIVERSITY—DENTAL DEPARTMENT.

THE seventeenth annual commencement exercises of the Dental Department of Vanderbilt University were held in the chapel of the University, Nashville, Tenn., on Thursday evening, March 26, 1896.

The charge to the class was delivered by Dr. W. H. Morgan, dean, and the class valedictory by E. F. Comegys, of Texas.

The number of matriculates for the session was one hundred and fifty-one.

The degree of D.D.S. was conferred on the following graduates by J. H. Kirkland, chancellor of the university:

NAME.	STATE OR COUNTRY.
George C. Albright	South Carolina.
Arthur Barnett	Alabama.
John Henry Boozer	Texas.
Moscow B. Cortler	Tennessee.
Edward F. Comegys	Texas.
James Patterson Day	Florida.
Alfred Wm. Dupuy	Alabama.
John Cecil Felix	Kentucky.
Charles G. Foulks	Alabama.
James Blount Jordan	Tennessee.
Wm. F. McKenney	Indiana.
Joseph T. Meadors	Tennessee.
Thomas F. Nanny	Kentucky.
George W. Parker	Ireland.
Robert L. Parker	South Carolina.
James Fogg Pickens	North Carolina.
Louis Frederic Riggs	Canada.
Edgar Dunn Rose	Texas.
Robert G. Rothrock	Tennessee.
Jesse Taylor Spain	Tennessee.
George A. Sladen	
Wm. Andrew Taylor	North Carolina.
John C. Whitefield	South Carolina.
Byrne A. Wilson	Missouri.
Albert B. Wiggonton	Illinois.
Charles B Woodard	Tennessee.
Lucian T. Wyllis	Tennessee.

UNIVERSITY OF IOWA—DENTAL DEPARTMENT.

THE fourteenth annual commencement exercises of the Dental Department of the State University of Iowa were held at the Opera House, Iowa City, Iowa, on Monday evening, March 9, 1896.

The annual address was delivered by Professor J. R. Guthrie, A.M., M.D.

The number of matriculates for the session was two hundred and eighteen.

The degree of D.D.S. was conferred on the following graduates by the president of the university:

NAME.	STATE.
Marshall B. Ayets	Iowa.
John P. Brennan	North Dakota.
Clarence P. Bevan	Iowa.
William H. Batcher	Iowa.
Leon L. Branson	Iowa.
Besse S. Casebeer	Iowa.
Peter F. Dempsey	Iowa.
George W. Eshelman	Iowa.
Thomas G. Ferreby	Iowa.
Samuel F. Heverly	Iowa.
Richard E Kidder	Iowa.
Norval Knight	Iowa.
Herbert N. Kelley	Iowa.
Ira D. Lutz	Illinois.
Charles B. Lewis	Iowa.
Friend C Leslie	Iowa.
Leon Mead	Pennsylvania.
William A. Meis	Iowa.
Leah Mills	Illinois.
Berton A. Miller	Iowa.
Otis M. Newman	Nebraska.
Leon L. Poston	Iowa.
Claude O. Pingrey	Iowa.
Fred A. Roe	Iowa.
William A. Reque	Minnesota.
Ray E. Sharp	Wisconsin.
Walter Stanford	Pennsylvania.
William E. Sauls	Nebraska.
Winfred E. Tubbs	Iowa.
Harry A. Tobie	Iowa.
Forrest G. Webber	Iowa.
Hugo Westhofen	Wisconsin.
Herbert H. White	Iowa.

KANSAS CITY DENTAL COLLEGE.

THE fourteenth annual commencement exercises of the Kansas City Dental College were held at the Auditorium, Kansas City, Mo., on Tuesday evening, March 31, 1896.

The salutatory was delivered by E. M. Blakey, D.D.S. ; the faculty address by Jabez N. Jackson, A.M., M.D. ; the valedictory by F. C. Kingsley, D.D.S., and the annual address by W. A. Quayle, D.D.

The number of matriculates for the session was one hundred and fifty-five.

The degree of D.D.S. was conferred on the following graduates by Alton H. Thompson, D.D.S., president of the faculty :

NAME.	STATE.	NAME.	STATE.
Ernest W. Allison	Kansas.	Sidney M. Major	Missouri.
Philip G. Brumbaugh	Kansas.	Edwin A. Morrow	Missouri.
Edwin L. Burner	Kansas.	James A. Morrow	Missouri.
Clarence E. Brown, B S.	Nebraska.	Edwin A. Morgan	Missouri.
Louis M. Breck	Kansas.	Scott R. Moore	Missouri.
Ernest M. Blakey	Missouri.	Harry B. Maxfield	Iowa.
Daniel B Baker	California.	Edward C. Morton	Kansas.
George G. Brock	Iowa.	Robert L. Poplin	California.
James F. Copeland	Kansas.	Vernon G. Palmer	Iowa.
Marshall P. Davidson	Missouri.	Frank J. Pribil, Jr.	Kansas.
William F. Driscoll	California.	Frederick F. Pound	Missouri.
Henry V. Enloe	Missouri.	Ira A. Roberts	Kansas.
Joseph K. Griffith, M.D.	Missouri.	Robert T. Shaw	Kansas.
George F. Hauser	Wisconsin.	David N. Smith	Nebraska.
Henry C. Heady	Missouri.	Charles V. Shoop	Missouri.
Daniel P. Harford	Missouri.	Aretas R. Scott	Nebraska.
Ed M. Hiner	Kansas.	Frederick C. Stote	Kansas.
William D Hall	Missouri.	Earle D. Toler	Missouri.
Charles D. Jackson	Nebraska.	Jesse W. Terwilliger	New York.
Frederick C. Kingsley	Kansas.	Edmond J. Treyer	California.
Walter E. Kendall	Kansas.	Charles H. Wikoff	Kansas.
George P. Lux	Kansas.	Charles F. Watkins	
Robert D. Lowrey	California.	William C. Young	Missouri.
LeRoy W. Moore	California.		

BIRMINGHAM DENTAL COLLEGE.

THE third annual commencement exercises of the Birmingham Dental College were held (jointly with those of the Medical College) at O'Brien's Opera House, Birmingham, Ala., on Friday evening, April 3, 1896.

The address to the graduates was delivered by Dr. J. H. Phillips, Superintendent of Education of the city of Birmingham, and the valedictory address by William B. Fulton, D.D.S., of the graduating class.

The number of matriculates for the session was forty-two.

The degree of D.D.S. was conferred on the following graduates by T. M. Allen, D.D.S., dean :

NAME.	STATE.	NAME.	STATE.
Robert E. Chafer	Florida.	G. Mansfield Lathem	Alabama.
W. H. Jett	Alabama.	W. B. Fulton, B.S.	Alabama.
L. A. Crumly, B.S.	Alabama.	Arthur D. Wright	Alabama.

MEHARRY MEDICAL COLLEGE—DENTAL DEPARTMENT

THE tenth annual commencement exercises of the Dental Department of Meharry Medical College (Central Tennessee College) were held in Nashville, Tenn., on Tuesday, February 4, 1896.

The valedictory was delivered by Edward D. Bulkley, D.D.S., and the address to the graduating class by Rev. John A. Kumler.

The number of matriculates for the session was eighteen.

The degree of D.D.S. was conferred on the following graduates by President J. Braden: C. S. Boyd, Tennessee; E. D. Bulkley, South Carolina; and W. T. Dinwiddie, Kentucky.

Beginning with the session of 1896–97, an attendance of four sessions will be required to complete the course in dentistry.

UNIVERSITY OF MARYLAND—DEPARTMENT OF DENTAL SURGERY.

THE annual commencement exercises of the Department of Dental Surgery of the University of Maryland were held at the Academy of Music, Baltimore, Md., on Wednesday, April 1, 1896, at 3 P.M.

The address to the graduates was delivered by Rev. Timothy P. Frost, D.D., and the class oration by Harley B. Lindsay, D.D.S.

The number of matriculates was two hundred and four.

After the reading of the mandamus by Professor Ferdinand J. S. Gorgas, dean, the degree of D.D.S. was conferred on the following graduates by Bernard Carter, Esq., provost of the university:

NAME.	STATE OR COUNTRY.
H T. Armstrong	New Brunswick.
William J. Baker	Pennsylvania.
Mabrey B. Bell	Maryland.
John P. Best	South Carolina.
Cornelius H. Bishop	New York.
Barnet Bliss	Russia.
D. L. Boozer, Jr., B S.	South Carolina.
George L. Bressler	Pennsylvania.
George G. F. Brook	California.
Samuel O. Brookes	Virginia.
Marcus Chargin	Russia.
Robert B. Cockrill	Montana.
Robert L. Combs	Texas.
W. F. Connally	Georgia.
Webster H Cooper	North Carolina.
John Sidney Couret	Louisiana.
Howard Eastman	Maryland.
John J. Ellis	South Carolina.
E. J. Etheredge	South Carolina.
Henry Frantz	Illinois.
Elias J. Friedland	Russia.
J. M. Greenough, Jr.	Jamaica, W. I.
William H. Haller	Virginia.
Vernon Hiscox	Connecticut.
William D. Hopkins	Maryland.
Andrew Huffman	West Virginia.
Clarence L. Jones	Ohio.
Antonio S. La Rue	Connecticut.
H. B. Lindsay, A.B.	South Carolina.
T. David MacLeod	Nova Scotia.
Willie J. McMinn	North Carolina.
Austin H. Mowel	New York.
John C. B. Patrick	South Carolina.
James W. Pierce	Alabama.
Charles H. Perdue	Georgia.
Samuel A. Shadrach	Virginia.
Richard L. Simpson	Virginia.
Thomas McC Smith	North Carolina.
Bennie E. Thomas	Texas.
J. Cromwell Truby	Pennsylvania.
Abraham Weinberg	South Carolina.
Albert F. Willets	Maine.

DENTAL SOCIETY ANNOUNCEMENTS.

WASHINGTON STATE DENTAL SOCIETY.

THE ninth annual meeting of the Washington State Dental Society will be held at Tacoma, May 18, 19, and 20, 1896.

ROBERT BRUCE GENTLE, *Secretary.*

AMERICAN MEDICAL ASSOCIATION—SECTION ON DENTAL AND ORAL SURGERY.

FOLLOWING is the program for the Dental and Oral Section of the American Medical Association :

Chairman's Address, Dr. R. R. Andrews, Cambridge, Mass.

"A Few of the Causes of Failures in the Dental and Medical Professions," Dr. B. B. Smith, Pensacola, Fla.

"Modern Methods of Treating the Antrum of Highmore," Dr. W. Xavier Sudduth, Chicago, Ill.

"Further Investigations upon the Antrum," Dr. M. H. Fletcher, Cincinnati, O.

"Cataphoresis," Dr. H. W. Gillett, Newport, R. I.

"The Technique and Pathology of the Peridental Membrane," Dr. V. A. Latham, Chicago, Ill.

"Movements of the Mandibular Condyles and Dental Articulation," Dr. W. E. Walker, Pass Christian, Miss.

"Disease of the Oral Cavity a Potent Factor of General Disease," Dr. S. W. Foster, Atlanta, Ga.

"Treatment of Children during the Period of Dentition," Dr. H. H. Johnson, Macon, Ga.

"Professional Congeniality," Dr. H. D. Wilson, Bainbridge, Ga.

"The Replacement of the Superior Maxilla by a Mechanical Appliance," Dr. Thos. P. Hinman, Atlanta, Ga.

"Practical Illustrations in Conservative Surgery," Dr. G. Lenox Curtis, New York, N. Y.

Paper (title not yet received), Dr. G. V. I. Brown, Duluth, Minn.

"Pyorrhea Alveolaris," Dr. E. S. Talbot, Chicago, Ill.

OFFICERS AND COMMITTEES OF PENNSYLVANIA STATE DENTAL SOCIETY.

DR. E. C. Kirk, president, Philadelphia ; Dr. H. N. Young, first vice-president, Wilkes-Barre ; Dr. Robert Huey, second vice-president, Philadelphia ; Dr. C. V. Kratzer, recording secretary, Reading ; Dr. V. S. Jones, corresponding secretary, Bethlehem ; Dr. G. W. Klump, treasurer, Williamsport.

State Board of Dental Examiners.—Dr. W. E. Magill, president, Erie ; Dr. J. C. Green, secretary, West Chester ; Dr. Louis Jack, Dr. L. Ashley Faught, both of Philadelphia ; Dr. C. S. Beck, Wilkes-Barre ; Dr. G. W. Klump, Williamsport.

Board of Censors.—Dr. W. H. Fundenburg, Pittsburg ; Dr. W. F. Litch, Philadelphia ; Dr. H. S. Seip, Allentown ; Dr. George D. B. Darby, Dr. H. B. McFadden, both of Philadelphia.

Executive Committee.—Dr. J. D. Thomas, Philadelphia ; Dr. D. N. McQuillen, Philadelphia ; Dr. J. A. Libbey, Pittsburg ; Dr. W. E. Magill, Erie ; Dr. G. W. Klump, Williamsport.

Committee on Legislative Action.—Dr. Louis Jack, Philadelphia ; Dr. E. P. Kremer, Lebanon ; Dr. Henry Gerhart, Lewisburg ; Dr. J. R. Yorks, Philadelphia ; Dr. W. H. Fundenburg, Pittsburg.

Committee on Enforcement of Dental Law.—Dr. J. G. Goshorn, Pittsburg; Dr. J. B. Kieffer, Altoona; Dr. Alonzo Boice, Dr. G. W. Warren, both of Philadelphia; Dr. W. A. Kessler, Pittsburg.

Publication Committee.—Dr. W. F. Litch, Philadelphia; Dr. C. N. Peirce, Philadelphia; Dr. C. V. Kratzer, Reading.

Clinic Committee.—Dr. H. Roberts, Philadelphia; Dr. A. Tees, Philadelphia; Dr. W. A. Kessler, Dr. W. H. Fundenburg, both of Pittsburg.

Local Committee of Arrangements.—Dr. George D. B. Darby, Philadelphia; Dr. H. N. Young, Wilkes-Barre; Dr. M. D. Bishop, Hanover.

Exhibit Committee.—Dr. P. K. Filbert, Pottsville; Dr. C. B. Bratt, Allegheny; Dr. H. B. McFadden, Philadelphia.

Committee on Revision of Constitution and By-Laws.—Dr. E. T. Darby, Dr. Robert Huey, Dr. Louis Jack, all of Philadelphia.

The annual meeting will be held at Bellefonte, Pa., July 14, 1896.

VICTOR S. JONES, *Cor. Sec.*,
Bethlehem, Pa.

TEXAS DENTAL ASSOCIATION.

THE Texas Dental Association will hold its annual meeting in Waco, beginning on Tuesday, May 12, 1896, and continuing through three days.

A committee on clinics appointed at the last meeting has secured a large number of clinicians, who will be ready to demonstrate almost everything of interest to the profession. In addition to this a number of papers have been promised, which, with discussions and the regular order of business, it is hoped will make the meeting one of unusual interest. Furthermore, it is expected the presence of several practitioners of note outside the state will be secured.

It is earnestly desired that every legal practitioner in the state who holds his profession in sufficient esteem to aid in its advancement will attend this meeting and unite with us in its upbuilding.

J. G. FIFE, *Sec.*, Dallas, Tex.

LOUISIANA STATE DENTAL SOCIETY.

THE officers of the Louisiana State Dental Society for 1896 are as follows: Dr. J. H. Landry, Plaquemine, president; Dr. R. L. Zelinka, first vice-president; Dr. M. W. Rainold, second vice-president; Dr. C. V. Vignes, recording secretary; Dr. S. J. Bourgeois, Morgan City, corresponding secretary; Dr. L. D. Archinard, treasurer; Drs. J. J. Sarrazin, C. Mermilliod, Sr., John W. Adams, C. Ratsburg, A. J. Foret, Wallace Wood, executive committee.

The Board of Dental Examiners is composed of Drs. A. G. Friedrichs, M. R. Fisher, J. M. Comegys, L. D. Archinard, and J. Paul Bayon, secretary, 643 Bourbon st., New Orleans.

The next annual meeting of the society will be held in New Orleans on March 3, 1897,—the day after Mardi-Gras.

C. V. VIGNES, *Rec. Sec.*,
Corner Canal and Bourbon sts., New Orleans, La.

VERMONT STATE DENTAL SOCIETY.

THE following are the officers of the above society elected at the annual meeting held March 18, 1896; Dr. F. P. Mather, Chester, president; Dr. C. S. Campbell, St. Albans, first vice-president; Dr. J. A. Robinson, Morrisville, second vice-president; Dr. Thomas Mound, Rutland, recording secretary; Grace L. Bosworth, Rutland, corresponding secretary; Dr. W. H. Munsell, Wells River, treasurer; Dr. K. L. Cleaves, Montpelier, Dr. H. Turrill, Rutland, Dr. C. W. Steele, Barre, executive committee; Dr. G. W. Hoffman, White River Junction, state prosecutor.

The next meeting will be held at Montpelier on the third Wednesday in March, 1897.

THOMAS MOUND, *Rec. Sec.*,
Rutland, Vt.

HARVARD ODONTOLOGICAL SOCIETY.

AT the annual meeting of the Harvard Odontological Society held February 29, 1896, the following officers were elected: Waldo E. Boardman, D.M.D., president; Joseph T. Paul, D.M.D., recording secretary; Drs. Joseph T. Paul, Frank T. Taylor, William P. Cooke, executive committee.

E. B. HITCHCOCK, *Cor. Sec.*

CHICAGO DENTAL SOCIETY.

FOLLOWING is the list of officers of the Chicago Dental Society for 1896–97, elected at the annual meeting, held in Columbus Memorial Building, Tuesday evening, April 7, 1896: Louis Ottofy, president; J. E. Hinkins, first vice-president; H. A. Costner, second vice-president; A. H. Peck, recording secretary; Geo. B. Perry, corresponding secretary; E. D. Swain, treasurer; H. A. Gunther, librarian; G. H. Cushing, member board of directors; G. T. Carpenter, B. D. Wikoff, G. W. Schwartz, board of censors.

GEO. B. PERRY, *Corresponding Secretary.*

NEW ORLEANS ACADEMY OF STOMATOLOGY.

THE officers of the New Orleans Academy of Stomatology for 1896 are as follows: Dr. Louis D. Archinard, president; Dr. Mozart W. Rainold, vice-president; Dr. C. V. Vignes, secretary and treasurer.

The Academy meets on the fourth Wednesday of every month.

C. V. VIGNES, *Secretary.*

LOUISVILLE ODONTOLOGICAL SOCIETY.

A NEW dental organization, with the title "The Louisville Odontological Society," has been formed in Louisville, Ky., for the encouragement of social and professional advancement by holding monthly meetings. The officers are Dr. W. E. Grant, president; Dr. M. M. Eble, vice-president; Dr. C. R. Shackleth, secretary and treasurer.

SOUTH DAKOTA STATE DENTAL SOCIETY.

THE South Dakota State Dental Society will meet at Sioux Falls, S. D., Wednesday, June 3, 1896.

The State Board of Examiners will also meet at the same time and place.

F. E. FIELD, D.D.S., *Acting Secretary.*

GEORGIA STATE DENTAL SOCIETY.

THE annual meeting of the Georgia State Dental Society will be held at Warm Springs, Ga., June 9 to 12, 1896. All dentists of good standing are most cordially invited to meet with us.

O. H. McDONALD, *Cor. Sec.*, Atlanta, Ga.

◆

EDITORIAL.

THE STUDY OF CHEMISTRY.

DURING a period covering the past twenty-five years the writer has had frequent opportunities for observing somewhat closely the attitude of numbers of students with respect to the study of chemistry. In recent years similar opportunities have arisen in which the attitude of practitioners, both of medicine and dentistry, with regard to chemical study have been noted, and it is a matter of continual surprise that with so large a body of otherwise intelligent men such a meager proportion acquire more than a mere smattering of knowledge upon a subject which is of vital importance in their work. At college the great majority of both medical and dental students pursue their chemical work reluctantly.

A few realize the immense practical value of a good working knowledge of chemistry, and master it to a degree that makes its use possible; but the number of these is so small a fraction of the professional body, that when the results of their special studies in this field are published for the benefit of their professional colleagues they are regarded almost as speaking in an unknown tongue. The practical results of their work are seized upon with avidity and applied in a purely empirical way, without any conception, or at least but a meager one, of the general scientific principles governing their application and vital to their successful operation.

That a knowledge of chemistry is as essential to the practice of medicine in all of its branches, including dentistry, as a knowledge of the multiplication table is to all the mathematical operations of life, is always frankly admitted when the matter is so stated. Yet how many practitioners make any such use of chemistry in their work?

In medicine the whole fabric of pharmacology, materia medica, and therapeutics rests upon a chemical foundation. Not a vague, idealistic chemical foundation, but one whose details have in nearly all cases been wrought out in a careful, painstaking, and thorough manner, and the scientific status of the material or drug so established that it may be intelligently applied. But even with the scientific status of our materia medica developed to its high standard, how many practitioners are competent to use drugs with any more intimate knowledge of their chemical properties and relationships than that displayed by a first-class cook in putting together the ingredients of a soup or pudding?

It may be claimed that the empirical method of the cook is successful in practice, and so it may be to a degree, but it is despite the method and not because of it. The empirical method is conditioned by chances and handicapped by ignorance; the scientific method, the method grounded in knowledge, includes neither accident nor chance. Numerous polemical essays have been written upon the question of whether medicine is or is not a science, and dentistry has had its share of the same controversial treatment. But whether or not these departments of human activity are essentially scientific does not affect the position of the fundamental fields of thought and investigation upon which they rest. Chemistry, upon which, more than any other factor, an intelligent, rational practice of dentistry depends, more nearly measures up to the definition of an exact science than any of the other medical or dental fundamentals. Its phenomena of cause and effect are founded in mathematical relationships, and its results are exact and definite.

As viewed in their relation to the phenomena of vital processes these chemical phenomena are complex, it is true, but they are nevertheless precise, and a clear mental grasp of the laws pertaining to the more simple chemical changes in matter furnishes the only means by which we can hope to understand the more intricate processes concerned in vital phenomena. The further investigation proceeds, the more clearly it is shown that all changes in the composition of matter, from the very simplest to the complex alterations which are included in the life cycle of cellular nutrition, take place in accordance with chemical laws. For this reason the study of chemistry is one which has a constantly increasing interest and importance. The whole subject of bacterial action and the combating of bacterial influence by disinfection resolves itself finally into a problem in chemistry; there is no factor which directly affects human life which is not in some degree related to chemistry. These facts are merely alluded to in a general way to emphasize the great importance of the subject, though such emphasis may perhaps be superfluous, as the truth of it is always freely admitted even by those who make no claim to chemical knowledge.

In medicine the empirical method has so largely dominated its department of therapeutics that the necessity for an intimate knowledge of chemistry has been to a large extent ignored in practice, and its application to the testing of the composition of the animal fluids, etc., for purposes of diagnosis, has been relegated to the trained specialist, so that the practitioner has in this way been relieved of embarrassment upon the score of his ignorance of the subject. The physician may by various makeshifts manage to overcome the obstacles which his lack of knowledge of chemistry gives rise to, and so also may the dentist ; but the conditions incident to dental practice are distinct and peculiar, and such that a want of chemical knowledge is a more serious handicap, in some respects, to him than to his medical confrère.

We do not write a prescription for the cure of a diseased tooth or for the replacement of lost teeth. We treat the case mechanically, as well as therapeutically, and both of these include a consideration and knowledge of the chemical relationships involved ; for in whatever way we deal with the relations of matter we have to do with its composition, which is the absolute domain of chemistry. The adaptations of dental instruments to their manifold uses is a question of their composition as well as of their form ; hence the problem of their chemical constitution is one of first importance. The physical properties of all our filling-materials is directly a question of their composition. The purity of gold is a measure of its working quality, and the word purity in this connection at once implies a question as to its composition with some other substance. The whole line of plastic fillings are a direct result of, in most cases, long and careful chemical research ; and there is scarcely another problem in dentistry which presents a greater complexity, or one of more intrinsic interest and importance to the dentist, than the variations in working qualities and physical conditions resulting from chemical differences in the zinc phosphate cements. The chemical relationships involved in every dental procedure, from the application of the rubber-dam to the collection of the fee for the operation, are more or less direct. There is no department of dental practice where the need for chemical knowledge does not in some way assert itself.

There is one branch of dental therapeutics in particular in which the application of chemical principles is more commonly ignored than it should be, viz : in the treatment of pulp-canals. In this department of dental therapeutics the problems presented are problems of chemistry pure and simple.

The sterilization of infected dentine, the removal of organic *débris* in the tubular structure, the bleaching of the teeth, all depend upon chemical processes which, unless intelligently carried out, result in failure, or even the production of a worse condition than originally existed.

For example, the recommendation to use iodin to "rust out" a fragment of a broach broken off in a pulp-canal is not infrequently made: evidently through ignorance of the fact that the "rusting out" process means the formation of the soluble iodid of iron, which permeates the dentinal structure and stains it an unsightly black. Or the use of strong solutions of mercuric chlorid as a disinfectant in tooth-structure permeated with hydrogen sulfid from putrefying albuminous matter, which also results in a permanent staining of the tooth; the use of potassium permanganate in root-canals as a dressing for disinfectant purposes; the use of instruments of gold or platinum in connection with some one of the various chlorin-bleaching methods under the mistaken impression that these metals are not attacked by the bleaching agent, and ignoring the fact that gold chlorid is one of the most powerful staining agents known to the dental histologist. Instances of this character might be multiplied indefinitely, were it necessary; but those given are sufficient to show that a fair knowledge of the chemistry of these substances would enable the operator to avoid disastrous mistakes in their use.

A fair knowledge does not mean that the dentist should be also a skilled chemist; but it does mean that in his study of chemistry he should realize that it has an importance to him at least the equal of any other department of his knowledge, and that he pursues it not for the purpose of gaining a diploma, but because it will be a tower of strength to him in his life-work.

There is no doubt that much of the lack of interest in chemistry among dental students grows out of the fact that the science is often taught to them as pure science and not as a special department of their practical work; and on this point there is room for improvement in many instances by selecting teachers of chemistry to dental students who are themselves dentists, or who have an intimate knowledge of the chemical needs of the dentist. The subject itself has no lack of interest when correctly and intelligently taught. It is perhaps not possible that the whole cause of the meager training of physicians and dentists in this important subject can be correctly formulated, but that a revival of interest in the matter is sorely needed cannot be doubted. It is a matter of profound regret, not to say discouragement, that in the great representative associations of this country, when from year to year the subject of dental chemistry is called up, the section has no report to make, or only an occasional paper is presented which is read to deaf ears and elicits no discussion because it is not understood.

The field is crying for cultivation, and should not be permitted to lie fallow as it has in the past.

BIBLIOGRAPHICAL.

THE PRINCIPLES AND PRACTICE OF DENTISTRY. Including Anatomy, Physiology, Pathology, Therapeutics, Dental Surgery and Mechanism. By CHAPIN A. HARRIS, M.D., D.D.S., late President of the Baltimore Medical College; Author of "Dictionary of Medical Terminology and Dental Surgery." Thirteenth Edition, Revised and Edited by FERDINAND J. S. GORGAS, A.M., M.D., D.D.S., Author of "Dental Medicine;" Editor of Harris's Dictionary of Medical Terminology and Dental Surgery; Professor of the Principles and Practice of Dental Science, Dental Surgery, and Prosthetic Dentistry, in the University of Maryland. With twelve hundred and fifty illustrations. Philadelphia, P. Blakiston, Son & Co. Price, cloth, $6.00 net.

This work has filled a place in dental education which no other single book was capable of doing. Its importance and value have been recognized from the date of its first appearance. With the steady increase in dental knowledge and the constant aggregation of new facts incident to dentistry the volume has expanded in size and scope, in the endeavor to compass the whole field. The time has been fully reached when the effort to combine in a single book, for the use of students, all of dental science and art should be abandoned, and the various subjects be treated in separate special works. To adequately cover the whole field in a single volume would require a larger tome than the book under consideration. To portray the subject within the limits of the present volume means a sacrifice of much matter of importance to the student. The book bears evidence of these difficulties with which the editor has endeavored to contend.

There is another feature of the present edition which is open to criticism. The attempt to retain the spirit and style of the original work has led to incongruities between the treatment of older, and in some cases obsolete, features, and those relating to more recent methods. These faults give a tone of vacillating uncertainty to many parts of the work. Gum-lancing in difficult dentition is dealt with in what our German brethren aptly style a "stiefmutterlich" manner, and the same stepmotherly treatment is accorded to the continuous-gum method. The reader is left in doubt as to whether it is worth while to essay either procedure.

The elaborate presentment of the operation of filing teeth to remove superficial decay, and of making permanent separations between teeth in anticipation of caries, should be relegated to the Gehenna of dental errors, as the better judgment of the profession is in these days opposed to such operations on principle. In fact, the writer from whose article the illustrations in the work are taken publicly recanted his faith in the procedure nearly eight years ago.

The "foot-shaped" pin in porcelain teeth is alluded to as a "recent and valuable" improvement. Its value is admitted, but the device is twenty-four years old.

The subject of bleaching teeth is inadequately treated ; it lacks scientific co-ordination, and is not explicit with respect to the details of the better methods while retaining several that are superseded.

There are to be noted also certain errors both of fact and direction.

Dr. Darby is quoted, p. 228, as opposed to the uric-acid theory of pyorrhea, whereas his writings are in furtherance of that theory.

Pulpless teeth, p. 307, are denominated "necrosed" teeth, which term should be applied only to those whose pulp and pericementum have been destroyed.

Labarraque's solution, p. 310, is treated as a solution of sodium chlorid.

Nitric acid is recommended, p. 870, for removing particles of lead adherent to gold plates after swaging in contact with a lead counter-die, and an acid-pan made of lead or copper is directed to be used for so treating the plate.

These are some of the errors which mar the work in places. Had the book been thoroughly rewritten and condensed as it should have been, and revised in all its parts with reference to the present status of our knowledge, mistakes of the character alluded to would have probably been fewer, and the work as a whole improved.

HEALTH NOTES FOR YOUNG WIVES. By AIMÉE RAYMOND SCHROEDER, M.D. New York : William Wood & Co., 1895.

This little book is a plain, common-sense guide intended for the information of young wives upon matters pertaining to personal hygiene during the period of pregnancy and the process of parturition. In addition to this, much valuable advice is given with respect to the hygienic care of the infant up to and including the period of weaning.

The spirit which animates the treatment of the entire subject is especially commendable from the fact that it is entirely free from all taint of faddism. The directions are clear and the advice sound, and in each particular it is dictated by the best of common sense. The advice given as to self-treatment pertains only to such matters as might safely be left to the personal care of any woman of average intelligence. The author carefully draws the line at such maladies and aberrations from normal health conditions as require the advice and care of the trained physician.

As is quite unusual in books of this type intended for popular reading, the advice respecting the care of the mouth and teeth is good orthodox teaching from the dental standpoint. In the preparation of this portion of the work the author has displayed her good sense in seeking the co-operation of a well-educated dentist, to whom due acknowledgment is made for his contribution to the work.

The book is one which the dental practitioner might with much propriety place in the hands of those of his patients who need the kind of information which it contains.

THE PRINCIPLES OF BACTERIOLOGY. A Practical Manual for Students and Physicians. By A. C. ABBOTT, M.D., First Assistant, Laboratory of Hygiene, University of Pennsylvania. Third edition, enlarged and thoroughly revised. With 98 illustrations, of which 17 are colored. Philadelphia, Lea Brothers & Co., 1895. Price, cloth, $2.50.

This is a work which fully measures up to its title. It is not a treatise nor an encyclopedia, but a thoroughly practical manual for students. It is essentially an answer to what to do and how to do it in the study of bacteriology. Beginning with an exposition of the general foundation principles of the subject, its details are progressively set forth, and every feature essential to their thorough comprehension fully elucidated. The book is a model for clearness and systematic arrangement. It is altogether the best book of its kind within our knowledge.

ELECTRICITY IN ELECTRO-THERAPEUTICS. By EDWIN J. HOUSTON, Ph.D., and A. E. KENNELLY, Sc.D. Pp. 412, with 128 illustrations. New York, The W. J. Johnston Company, 253 Broadway, 1896. Price, $1.00.

This little work is an exposition of so much of electro-physics as is applicable to electro-therapeutics. It sets forth the scientific principles of the subject in such a manner as to make possible their intelligent and therefore safe application in the art of therapeutics.

No pains have been spared by the authors in their elaboration of the electro-technic phase of the subject; in fact, this department is emphasized somewhat out of proportion to the strictly therapeutic side, in which latter feature the book is in some degree disappointing. As both of the authors are experts in electro-physics, and apparently neither is a physician, the paucity of matter pertaining to the therapeutic applications of electricity is not to be wondered at. As an exposition of the principles applicable to electro-therapeutics the book has much value and interest, but as a study of electricity in the treatment of disease it is wholly inadequate.

CATCHING'S COMPENDIUM OF PRACTICAL DENTISTRY FOR 1895. B. H. Catching, D.D.S., Editor and Publisher, Atlanta, Georgia. 318 pages, 8vo, cloth. Price $3.00.

Succeeding editions of this valuable work have been favorably noticed in this journal as they have appeared. The issue for 1895 exhibits the same progressive improvement which has characterized its predecessors. A new and valuable department has been added embracing concise reviews of the progress made in the domains of dental science during the year.

A work which gives the cream of dental advancement in such satisfactory form and manner should find a place among the working books of every dentist who desires to keep abreast of the times.

PAMPHLETS RECEIVED.

Transactions of the College of Physicians of Philadelphia. Third series. Vol. XVII. Philadelphia, printed for the College, 1895.

Report of the Commissioner of Education for the Year 1892–93. Vol. II, containing Parts III and IV. Washington, Government Printing Office, 1895.

OBITUARY.

DR. JOSEPH BEALS.

DIED, at Greenfield, Mass., March 27, 1896, of consumption, Dr. JOSEPH BEALS, in the seventy-fifth year of his age.

Dr. Beals was born at Plainfield, Mass., August 6, 1821. Adopting dentistry as his profession soon after his majority, he studied with Dr. Gates, of Greenfield, and subsequently with Dr. Smith, of Northampton. In the fall of 1845 he opened an office in Greenfield, and commenced a practice destined to extend over a long period of time, and to bring him marked success. He became an expert operator, and was especially successful in gold-plate, continuous-gum, and crown work. In his early practice he carved the artificial teeth supplied to his patients, and many fine specimens of his earlier work are still doing good service. He was, however, a progressive man, and was up to date in practice. He had been a subscriber to this journal from its inception to the time of his death. He was one of the originators of the Connecticut Valley Dental Society, and was for some time its president. He always interested himself in whatever pertained to the advancement of dentistry.

Dr. Beals took much interest in public matters, and held offices of trust in his community. He was a member of the Masonic and Odd-Fellows fraternities, and was ever active in promoting charitable and educational enterprises. His warm and sympathetic nature made for him many friends, and his skill in his profession gave him an enviable reputation far beyond the limits of his own community. Many years ago he became an ardent Spiritualist, and was for a long time president of the Lake Pleasant Spiritualist Association. About four years ago he relinquished active practice, and made prolonged visits to Colorado in search of health, but gained little permanent relief. His malady slowly increased until death released him.

In January, 1848, Dr. Beals was married to Frances A. Bosworth, of West Springfield, who survives him. They had five children, one daughter and four sons, three of whom are practicing dentists,—Dr. Joseph H. Beals, in Denver, Col.; Dr. H. R. Beals, in Keene, N. H.; and Dr. F. D. Beals, who succeeds his father in Greenfield. One son, Willis H., achieved some success as an artist, but died about six years ago.

DR. EVERETT M. BAKER.

DIED, in Medina, Orleans Co., N. Y., February 3, 1896, of pneumonia, Dr. EVERETT MILFORD BAKER, aged forty-one years.

Dr. Baker was born in the town of Cambria, Niagara county, N. Y., April 7, 1855. In early life he evinced a fondness for study and developed correct and exemplary habits. Upon leaving the district school he entered the Lockport Union School, where he finished his preliminary education.

Having early chosen dentistry as his life work, he entered the dental office of Drs. Balcom & Dickinson, in Lockport, for a term of years, subsequently completing his preparation for practice by attending the Philadelphia Dental College, from which he graduated in the spring of 1877. The same year Dr. Baker opened an office in Medina, where by his industry and skill, added to a pure and blameless life, he came into possession of a large and lucrative practice.

He was a member of the Eighth District Dental Society, and at the time of his death its corresponding secretary. He commanded the respect and esteem of his fellow-associates for his manly and courteous bearing, as well as for his interest in the affairs of the society.

In the community in which he lived he was identified with religious, social, charitable, and fraternal organizations in which his public spirit and interest in the welfare of his fellow-men was strongly manifested. He was an officer in the Presbyterian Church, the Young Men's Christian Association, and the Masonic Lodge.

Dr. Baker leaves a widow, with one daughter and two sons.

DR. A. B. WELLS.

DIED, at Holland Patent, N. Y., March 19, 1896, by suicide, Dr. A. B. WELLS, in the sixty-third year of his age.

Dr. Wells committed suicide by drowning himself in a cistern connected with his residence. He had been in poor health for some time. About four weeks before his death he was taken with the grip, which left his system prostrated. He was a great sufferer from insomnia,—so much so that he became quite apprehensive of his condition. Besides, the death of his wife last year, and the untimely death of a son, had tended to unbalance his mind.

Dr. Wells was born at Holland Patent, N. Y., June 1, 1833, and passed his boyhood on a farm. He commenced the study of dentistry in 1857, with Dr. Priest, of Utica, with whom he remained a year after completing his studies. He had steadily practiced his profession in Holland Patent and Boonville since 1860, being at the former place the first three days and at the latter place the last three days of each week. One who knew him speaks of him as being highly respected for his lovable qualities, deeply interested in the welfare of the village, a kind neighbor, an indulgent father, and a trusted friend.

On September 15, 1864, Dr. Wells was married to Miss Dora Townsend, of Holland Patent. They had three children,—a son and daughter, now deceased, and Dr. I. G. Wells, now in the practice of dentistry.

DR. GEORGE S. FOUKE.

DIED, at Westminster, Md., April 9, 1896, after an illness of several weeks, Dr. GEORGE S. FOUKE, in the seventy-ninth year of his age.

Dr. Fouke was born at Shepherdstown, W. Va., October 11, 1817. He was a graduate of Gettysburg (Pa.) College, and was subsequently appointed principal of the Waynesboro Academy. While occupying this position he prepared himself for the Lutheran ministry, and was graduated from the Gettysburg Theological Seminary. On account of throat trouble, however, he was compelled to relinquish the ministry. He resumed teaching, and at the same time studied dentistry.

In 1848 Dr. Fouke moved to Westminster and commenced what proved to be a long and prosperous practice of dentistry at that place. In his early practice he at stated periods visited professionally the villages in the surrounding country. In November, 1854, he was chosen dentist to New Windsor College, St. Joseph's, and Mt. St. Mary's Colleges, at Emmitsburg, retaining the last two appointments up to a short time previous to his death. He was also for a number of years a visitor to the Baltimore College of Dental Surgery, was a member of the State Board of Dental Examiners, and had published many professional papers.

In religion Dr. Fouke was an Episcopalian, and was always active in charitable work. He was also a Mason, and had been several times a member of the city council. He had been twice married, and leaves several children, one of whom is a practicing dentist in Westminster.

RESOLUTIONS ON DEATH OF DR. W. H. DWINELLE.

AT the regular monthly meeting of the American Academy of Dental Science held April 1, 1896, the following resolutions were adopted:

WHEREAS, In the death of Dr. W. H. Dwinelle the American Academy of Dental Science loses an esteemed honorary fellow whose long and active life has been of unusual benefit to our profession; therefore be it

Resolved, That the American Academy of Dental Science hereby records its sense of sorrow in the death of Dr. W. H. Dwinelle, being a loss to our society as well as to our whole profession;

That to his family we extend our sincere and heartfelt sympathy;

That upon the records of our society the above be recorded in affectionate memory, and a copy of it be sent to his family.

[Signed by J. G. W. Werner, Eugene H. Smith, Charles H. Taft, Committee.] GEORGE T. BAKER, *Recording Secretary.*

◆

HINTS, QUERIES AND COMMENTS.

AN IMPORTANT CORRECTION.—In the paper read upon plantation of teeth before the Academy of Stomatology of Philadelphia, December 17, 1895, I credited Dr. Cutler with having made, in 1877, the first publication of the alteration of the alveolus to adapt it to the size and form of the tooth to be transplanted. This appears to be in error, since I have found later that in an article by Dr. Wm. N. Morrison before the American Dental Association in 1876, and published in its Transactions, he described the obliteration of the septum of an inferior second molar to receive the root of a third molar, the roots of which were coalesced. Therefore the credit for re-forming the alveolus should be given to Dr. Morrison.

It may be of interest to state that previous to 1876 Dr. Morrison had replanted and transplanted over forty teeth.—LOUIS JACK.

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—For the benefit of those who may desire to look up Dr. Hayden's article, referred to in my remarks before the Academy of Stomatology, I desire to correct an error in the report. Dr. Hayden's article was originally published in the *Medical Recorder*, Philadelphia, 1822, and was reprinted in the *American Journal of Dental Science*, vol. ii, March, 1842, page 214.

The report does not clearly express my views on the subject under discussion. I am at sea as to that which is included by writers of the present day under the term pyorrhea alveolaris. The conditions which I recognize by that term I do not consider incurable; the case cited, one of several, is evidence that if the changes there resulting from purely natural causes can be produced therapeutically, the disease is in our power. Thus far I have failed so to do. I have not known a case where it has been done and the affected teeth retained. Treatment with me has palliated the disease and prolonged the comfortable usefulness of the teeth, but in its presence I feel as must a physician feel when he recognizes the presence of cancer or tuberculosis. WILLIAM H. TRUEMAN.

A POWERFUL HEMOSTATIC.—Since last year I have been using a mixture of antipyrin and salol for checking all kinds of hemorrhage in dental surgery. At present I rely upon this remedy with much confidence. It seems to me that the said mixture possesses a styptic power superior to any one of the substances generally used for that purpose.

To prepare the mixture I put into a test-tube equal parts of antipyrin and salol. Then fuse the contents of the tube over a spirit lamp until the clear liquid immediately resulting after the application of heat has turned to a hazel color. If prepared in this way the mixture will remain longer in a liquid state. Antipyrin alone is a powerful hemostatic, but becomes solid so quickly after you lift it up in a pellet of cotton that it cannot practically be used in dentistry.

During the last few months I have had occasion to appreciate the value of antipyrin and salol in artificial crown- and bridge-work. Contrary to all other astringents, the mixture of these substances rather dissolves than coagulates the blood, but checks the flow. Applied to the wounded gum, it leaves a clean, dry, raw surface.

I have not found anything better for hemorrhage after extraction.—A. E. MASCORT.

IMPURE ALCOHOL.—A correspondent writes that he has "ruined many gold fillings by the use of inferior alcohol" in his annealing lamp,—an observation which we have occasionally heard made by other practitioners. There seems to be no good reason why certain impurities in alcohol when used in annealing lamps should not impair or destroy the cohesiveness of gold foil. Will any one who has had experience in this respect kindly favor us with a report of it for publication?—ED. DENTAL COSMOS.

PHOSPHORATED OIL.—A recommendation of this preparation as a sovereign remedy for odontalgia by H. Prinz, of Halle, Germany, is being largely copied and published by dental journals. The material consists of a solution of one part of dry phosphorus in eight parts of olive oil. The directions for its use as an application to an aching pulp are, to first clean out and dry the cavity of decay, and then apply a few drops of the phosphorated oil upon cotton and seal it in place with gutta-percha.

We have not made this interesting experiment, nor do we intend to do so, as the thing has a decidedly suspicious look. But will some one who knows all about such things tell us for the benefit of humanity why a solution of phosphorus sealed into a carious tooth is not a rapid-transit method for inducing phosphor-necrosis of the maxilla? Upon general principles the device, as described, appears to have some points of advantage over residence in a match or phosphorus factory for producing the disease in a neat and elegant manner.—ED. DENTAL COSMOS.

PEROXID OF SODIUM USED DRY.—For some months I have been using sodium peroxid in a manner similar to or identical with that recommended by Dr. Schreier with the potassium-sodium alloy.

The rubber-dam is applied and the canals freely opened; a fine iridium broach, which has been roughened, is dipped in the sodium peroxid powder and carried into the canal dry; each canal is treated to three or more applications. In a few moments effervescence indicates the chemical change consequent upon bringing this salt in contact with putrefying matter. The action of this agent is less violent than that of the kalium-natrium, and quite as effective. As soon as effervescence ceases the canals are washed out with a weak solution of sulfuric acid, dried, and other applications of the sodium salt made.—H. H. BURCHARD.

PLATIR.—An alloy of platinum and iridium has long been in use by dentists in plate, wire, and other forms, and a brief designation of the alloy has hence become a desideratum. Iridio-platinum, or platinum and iridium, have hitherto been the cumbersome terms used for indicating the compound metal, and in the interest of economy, brevity, and perspicacity the term platir is suggested. Platir plate, platir wire, platir posts, etc., may therefore well be so designated whenever those articles are desired to be composed of an alloy of platinum and iridium.—W. STORER HOW, D.D.S., Philadelphia, Pa.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

The abbreviations of titles used are those common to bibliographical work, and will, it is presumed, be readily comprehended by any one familiar with dental or scientific publications. Any explanation will be gladly furnished by the compiler. A star (*) indicates a Thesis.

Association générale des dentistes du sud-est de la France. Bulletin-journal de la réunion tenue à Nice. Nice, 1895, imp. Malvano-Mignan. 8°.

Brugger (H.) Die Behandlung der Gaumenspalten mit besonderer Berücksichtigung der Prothesen mit Korkkern. Basel, 1895, C. Sallmann, 66 p. roy. 8°.

Bruneau. Guide pratique de l'extraction des dents : à l'usage du médecin ; suivi de la description de la greffe dentaire par restitution immédiate. Paris, 1896. 8°.

California State Dental Association. Transactions : 25th annual meeting, 1895. San Francisco, 1895. 8°.

von Chrzanowski (Josef.) * Ueber das Empyem des Antrum Highmori. Königsberg i. Pr., 1895, 28 p. 8°.

Giletti (Alessandro.) Tricofitiasi primitiva della mucosa boccale. Torino, 1895, V. Fodratti & E. Lecco, 10 p., 1 l., 3 pl. roy. 8°.

Juvara (E.) Anatomie de la région ptérygo-maxillaire. Paris, 1895, J.-B. Baillière & fils, 65 p. 8°.

Lennmalm (Hermann.) World's history and review of dentistry ; from the most reliable and authentic sources available. Chicago. 1895, W. B. Conkey Co., vi, 420 p. 8°.

Lohmann (A.) Die Krankheiten des Mundes und der Zähne, ihre Ursachen und ihre Verhütung allgemein verständlich dargestellt. Kassel, 1896, M. Brunnemann. 8°.

Maltese (Francesco.) L'odontojatria nei suoi rapporti con l'antropologia. Riflessioni e demostrazioni. Napoli, 1895, tip. ed del Fantasio, 44 p. 8°.

von Metnitz (J. R.) Lehrbuch der Zahnheilkunde. 2. Aufl. Wien, 1895, Urban & Schwarzenberg, 371 p. roy. 8°.

Nederlandsch Tandheelkundig Genootschap. Handelingen, 2. serie, 2. und 3. Aflevering. Utrecht, 1895, J. L. Beijers. 8°.

Polscher (August.) Lehrbuch der zahntechnischen Metallarbeit. 1 Lfg. Oppeln, 1896, G. Maske, 363 p. roy. 8°.

Richter (E.) Sammlung der Prüfungs-Aufgaben für die zahnärztliche Staatsprüfung an den sämmtlichen deutschen Universitäten. 1. Hft. Die Prüfungscommissionen im Königr. Preussen. Berlin, 1895, Fischer, 17 p. 12°.

Schech (Philipp.) Die Krankheiten der Mundhöhle, des Rachens und der Nase. 5. völlständig neu bearbeitete Aufl. Leipzig & Wien, 1896, F. Deuticke, ix, 1 l., 421 p. 8°.

Thomann (Max.) * Beitrag zur Behandlung chronischer Erkrankungen der Gaumenmandeln. Freiburg i. B., 1895, C. Lehmann, 46 p., 1 l., 3 pl. 8°.

Torger (O.) Die Hygiene des Mundes, insbesondere die Pflege und Erhaltung der Zähne bei Erwachsenen und Kindern. Eine zeitgemässe Betrachtung für Eltern, Lehrer und Erzieher. Prag, 1895, J. G. Calve, 60 p. 12°.

Allen (C. C.) The grinding and backing of porcelain facings. West. Dent. J., Kansas City, 1896, x, 97-99.—**Amoedo** (O.) Un cas de prothèse immédiate du maxillaire inférieure. Odontologie, Par., 1896, 2. s., iii, 84-87.—**Andrews** (R. R.) Calcification. J. Am. M. Ass., Chicago, 1896, xxvi, 468-477.—**Angle** (E. H.) Orthodontia. Dental Rev., Chicago, 1896, x, 171-175.—**Baldwin** (W. A.) Interstitial glossitis. Cincin. M. J., 1896, xi, 143.—**Ballowitz** (E.) Eine seltene Zahnanomalie im Zwischenkiefer eines menschlichen Schädels. Arch. f. Anat. u. Entwcklngsgesch., Leipz., 1895, 286-288, 1 pl.—**Barrett** (W. C.) The classification of the so-called green stain of the teeth. Brit. J. Dent. Sc., Lond., 1896, xvi, 164-167.—**Bennecke** (E.) Beitrag zur Kenntnis der centralen epithelialen Kiefergeschwülste. Deutsche Ztschr. f. Chir., Leipz., 1895-6, xlii, 424-452, 4 pl.—**Bérard** (L.) De l'actinomycose humaine. Gaz. d. hôp., Par., 1896, lxix, 253 ; 289 —**Bernard** (A.) Le mal perforant buccal tabétique. Odontologie, Par., 1896, 2. s., iii, 80-84.—**Bernays** (A. C.) A case of excision of both upper jaws [etc.] for the removal of a recurrent osteochondroma. Med. Rec., N. Y., 1896, xlix, 443-445.—**Beyer** (E. F. B.) The dental anatomy of the invertebrates. Brit. J. Dent. Sc., Lond., 1896, xxxix, 202-213.—**Bilhaut** (M.) Bec de lièvre bilatéral ; fissure palatine complète ; uranostaphylorrhaphie ; restauration de la lèvre supérieure, dans un deuxième temps opératoire. Rev. odontol., Par., 1896, xxxi, 72-80.—**Bingham** (Stillman R.) [1829-96.] (Obituary.) Dental Cosmos, Phila., 1896, xxxviii, 260-263, portr. ——— *Also:* Dental Rev., Chicago, 1896, x, 161. ———*Also:* West. Dent. J., Kansas City, 1896, x, 49, portr.—**British Dental Association.** Fifth report . . . as to the condition of the teeth of school children. J. Brit. Dent. Ass., Lond., 1896, xvii, 75-78.—**Burchard** (H. M.) The origin of salivary calculus. Am. J. Dent. Sc., 1896, xxix, 497-508.—**Buxton** (D.) The nature of anæsthesia. Dental Rec., Lond., 1896, xvi, 67-74.—**Carmichael** (J. P.) Crown and bridge work. Dental Rev., Chicago, 1896, x, 103-106.—**Cunningham** (G.) The advantages of a systematic training in mechanical dentistry. *Ibid:* 106-112. [Discussion], 122-124.—**Daboll** (G. C.) The mission of the matrix. Dental Rev., Chicago, 1896, x, 100-103. [Discussion], 117-122.—**Damain.** Le cinématographe. Rev. odontol., Par., 1896, xxxi, 66-72.—**Darby** (G. D. B.) Is uric acid an important factor in dental disease? Internat. Dent. J., Phila., 1896, xvii, 143-151. [Discussion], 180-189.—**De Marsi** (A.) Contributo allo studio delle cisti della mascella inferiore. Bull. d. Soc. med. di Bologna, 1895, 7. s., vi, 518-525.—**Dwinelle** (William Henry.) [1819-96.] (Obituary.) Dental Reg., Cincin., 1896, l, 154. ——— *Also:* Dental Rev., Chicago, 1896, x, 238.—**Ellis** (J.) Shun bolted flour: why Americans lose their teeth at an early age. Dental Reg., Cincin., 1896, l, 124-126.—**Farrar** (J. N.) Anchorage. West. Dent. J., Kansas City. 1896, x, 126-128. ——— Correction of a double difficult case of irregularities of the teeth at thirty years of age. Ohio Dent. J., Toledo, 1896, xvi, 57; 118.—**Farlow** (J. W.) Some remarks on removal of the tonsils. Tr. Am. Laryngol. Ass., 1895, N. Y., 1896, xvii, 60-64.—**Flagg** (J. F.) Preparation of pulp-cavity and canals. Dental Cosmos, Phila., 1896, xxxviii, 199-204.—**Fox** (Charles James.) [1833-96.] (Obituary.) Dental Rev., Chicago, 1896, x, 162.—**Friedemann.** Ueber die Topographie der Cavitäten und ihre Anwendung in einem neuen zahnärztlichen Krankenbuche. Deutsche Monatschr. f. Zahnh., Leipz., 1896, xiv, 105-124.—**Gebühren** für approbirte Zahnärzte. Deutsche med. Wchnschr., 1896, xxii, No. 10, Sonderbeil., 4.—**Geronzi** (G.) Su di un caso di emiatrofia linguale. Bull. Soc. Lancisiana d. osp. di Roma, 1895, xiv, fasc. 1, 36-45.—**Globensky** (S.) A few notes on dental prosthetics. Am. J. Dent. Sc., Balt., 1896, xxix, 508-511.—**Godon** (C.) La fin d'une transplantation. Odontologie, Par., 1896, 2. s., iii, 103-105. ——— Note sur la rétractilité de l'amalgame et l'imperméabilité des obturations. *Ibid:* 6-9.—**Graham** (G. W.) A tooth growing in the nose. Charlotte [N. C.] M. J., 1896, viii, 155.—**Gregson** (George.) [1821-96.] (Obituary.) Dental Rec., Lond., 1896, xvi, 81. ——— *Also:* J. Brit. Dent. Ass., Lond., 1896, xvii, 122.—**Hamilton** (T. K.) Case of xerostomia. Australas. M. Gaz., Sydney, 1895, xiv, 480-482.—**Hattyasy** (L.) [Effect of caustic potash and hydrochloric acid in the treatment of gangrene of the root-canal.] Orvosi hetil., Budapest, 1896, xl, 86; 102.—**Heckler** (J. W.) The treatment of teeth and roots preparatory for crowning. Dental Cosmos, Phila., 1896, xxxviii, 205-208.—**Henister** (J. G.) The destruction of children's teeth; cause and prevention. J. Am. M. Ass., Chicago, 1896, xxvi, 414.—**Hewett** (A. C.) Dental amalgams. Dental Rev., Chicago, 1896, x, 176-188. [Discussion], 202-214.—**Hofmeister** (F.) Zur Schleich'schen Infiltrations-Anästhesie. Beitr. z. klin. Chir., Tübingen, 1895-6, xv, 563-575.—**Jack** (L.) Plantation of teeth. Dental Cosmos, Phila., 1896, xxxviii, 185-193. [Discussion], 243-245. ——— *Also:* Internat. Dent. J., Phila., 1896, xvii, 133-143. [Discussion], 171-175.—**Jean** (F.) Nouveaux appareils de redressement. Odontologie, Par., 1896, 2. s., iii, 9-13.—**Jenkins** (C. W.) The president's address. [American Dental Society of Europe.] Dental Rev., Chicago, 1896, x, 88-94.—**Jones** (J. H.) Treatment of deciduous teeth. Brit. J. Dent. Sc., Lond., 1896, xxxix, 193-202. [Discussion], 231-233.—**Joseph** (M.) De la gangrène névropathique de la pulpe dentaire. Odontologie, Par., 1896, 2. s., iii, 65-80.—**Kells** (Charles E.), *sr.* [1827-96.] (Obituary.) Dental Cosmos, Phila., 1896, xxxviii, 264.—**Knight** (C. H.) Cyst of the maxillary sinus. Tr. Am. Laryngol. Ass., 1895, N. Y., 1896, xvii, 159-163.—**Landgraf.** Zur Pathologie des weichen Gaumens. Berl. klin. Wchnschr., 1896, xxxiii, 202-204.—**Lemerle.** Etude sur la densité des aurifications d'après les différents modes opératoires. Odontologie, Par., 1896, 2. s., iii, 1-6.—**Linkenheld.** Zur Kieferhöhleneiterung. München. med. Wchnschr., 1896, xliii, 176.—**Loup.** Injecteur automatique d'antiseptiques avec chauffeur d'eau et appareil distributeer d'antiseptiques. Odontologie, Par., 1896, 2. s., iii, 89.—**McKay** (R.) Amalgam. Dental Rec., Lond., 1896, xvi, 57-64.—**Magnan.** Rétrécissement pharyngien. J. de méd. de Bordeaux, 1896, xxvi, 82.—**Marthen** (G.) Ueber tödtliche Chloroform-Nachwirkung. Berl. klin. Wchnschr., 1896, xxxiii, 204-207.—**MaWhinney** (E.) Systemic medication for dental purposes. Dental Rev., Chicago, 1896, x, 81-88.—**Miller** (W. D.) The transparent zone in decay of the teeth. Brit. J. Dent. Sc., Lond, 1896, xxxix, 175-183.—**Mills** (W. A.) Specific treatment of necrosis of the alveoli and maxillæ with aromatic sulphuric acid. J. Am. M. Ass., Chicago, 1896, xxvi, 518.—**Mingazzini** (G.) Osservazioni cliniche ed anatomiche sull'emiatrofia della lingua. Arch. ital. de otol. [etc.], Torino, 1896, iv, 74-92.—**Morton** (W. J.) Electric medicamental diffusion, or cataphoresis and its relation to dental surgery. Dental Cosmos, Phila., 1896, xxxviii, 210-232.—**New York dental law.** J. Am. M. Ass., Chicago, 1896, xxvi, 593.—**Palmer** (S. B.) Adaptation of fillings to conditions of the teeth, together with electrical disturbances caused by gold, tin and amalgam fillings. Ohio Dent. J., Toledo, 1896, xvi, 128-133. ——— Dental science then and now. Am. J. Dent. Sc., Balt., 1896, xxix, 481-497.—**Park** (R.) Carcinoma of lip and jaw. Med. News, N. Y., 1896, lxviii, 322. —**Patterson** (J. D.) Medicinal treatment vs. expert manipulation in dental practice. West. Dent. J., Kansas City, 1896, x, 99-101.—**Peck** (A. H.) The preparation of compound proximal cavities in bicuspids and molars. Dental Rev., Chicago, 1896, x, 75-81.—**Poinsot.** Action galvanique des appareils métalliques dentaires. Odontologie, Par., 1896, 2. s., iii, 14-16.—**Preiswerk** (G.) Ein Fall von Neuralgie auf septischer Grundlage. Deutsche Monatschr. f. Zahnh., Leipz., 1896, xiv, 100-102.—**Read** (T. G.) Presidential address. [Bread and dental caries.] Brit. J. Dent. Sc., Lond., 1896, xxxix, 214-220.—**Rhein** (M. L.) Alveolar abscess: preventive and curative treatment. Dental Cosmos, Phila., 1896, xxxviii, 193-199. [Discussion], 237-242. —**Riesman** (D.) Xerostomia (dry mouth), with the report of a case. Phila. Polyclin., 1896, v, 91.—**Roach** (J.) Common ground of medicine and dentistry. J. Am. M. Ass., Chicago, 1896, xxvi, 412-414.—**Robbins** (C.) Amalgams in everyday practice. J. Brit. Dent. Ass., Lond., 1896, xvii, 78-85.—**Röse** (C.) Das Zahnsystem der Wirbeltiere. Anat. Hefte, 2. Abt., Wiesb., 1895, iv, 542-591.—**Rollins** (W. H.) Dental anæsthesia by cataphoresis. Internat. Dent. J., Phila., 1896, xvii, 151-153.—**Ross** (F. W. F.) Decayed teeth and puerperal fever. Brit. M. J., Lond., 1896, i, 696.—**Roughton** (E. W.) Tumours of the mandible. Brit. J. Dent. Sc., Lond., 1896, xxxix, 145-155.—**Roussel.** Epithéliome de la langue. Loire méd., St.-Etienne, 1896, xv, 41.—**Roy** (M.) De l'allongement des dents dépourvues d'antagonistes. Odontologie, Par., 1896, 2. s., iii, 16-20. ——— Note au sujet de deux cas d'éruption tardive. *Ibid:* 87.—**Rymer** (J. F.) Rhizodontrophy. J. Brit. Dent. Ass., Lond., 1896, xvii, 87-89.—**Spear** (J. M.) Antisepsis. Am. J. Dent. Sc., Balt., 1896, xxix, 512-518.—**Spring** (W. A.) Tin and gold. Dental Rev., Chicago, 1896, x, 94-97. [Discussion], 112-117.—**Starck** (H.) Tuberculöse Halsdrüsen im Zusammenhang mit cariösen Zähnen. München med. Wchnschr., 1896, xliii, 145-147.—**Stearns** (G. O.) [1815-96.] (Obituary.) Dental Cosmos, Phila., 1896, xxxviii, 264. —**Stoos** (M.) Zur Aetiologie der Stomatitis aphthosa. Mitth. a. Klin. u. med. Inst. d. Schweiz, Basel u. Leipz., 1895, 3. R., 85-102, 1 pl. ——— Untersuchungen über den Soor des Mundes. *Ibid:* 103-130, 1 pl.—**Thompson** (A. H.) The progress of modern methods in dental practice. J. Am. M. Ass., Chicago, 1896, xxvi, 519-521.—**Tims** (H. W. M.) Notes on the dentition of the dog. Anat. Anz., Jena, 1895-6, xi, 537-546.—**Tomes** (C. S.) On the chemical composition of enamel. J. Physiol., Lond., 1896, xix, 217-223.—**Wardill** (G. J.) Death under chloroform at a dentist's rooms. Lancet, Lond., 1896, i, 803.—**Webster** (G. A.) Some interesting cases. West. Dent. J., Kansas City, 1896, x, 87-90.—**West** (R. M.) Two cases of gangrenous stomatitis, one ending fatally. Lancet, Lond., 1896, i, 704.—**Wilson** (G. H.) Artistic staining of artificial teeth. Ohio Dent. J., Toledo, 1896, xvi, 113-117.—**Wittkowski.** Ueber die mangelhafte Berücksichtigung des Schönheitssinnes in der zahnärztlichen Technik. Deutsche Monatschr. f. Zahnh., Leipz., 1896, xiv, 80-86.—**Wright** (J.) A cyst of the nasopharynx and a cyst of the oropharynx. Tr. Am. Laryngol. Ass., 1895, N. Y., 1896, xvii, 171-176. —**Young** (W. G.) A case of trifacial neuralgia cured by neurectomy. Med. Mirror, St. Louis, 1896, vii, 64-67. ——— *Also:* West. Dent. J., Kansas City, 1896, x, 101-105.

◆

LIST OF UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING MARCH, 1896.

March 10.—No. 556,202, to GEORGE W. NUTZ. Dental plugger.
" *17.*—No. 556,701, to GEORGE B. SNOW. Oil-flame regulator for vulcanizers.
" " No. 556,702, to GEORGE B. SNOW. Oil-flame regulator for vulcanizers.
" *24.*—No. 556,952, to C. E. AKELEY and C. G. JUNKERMANN. Head-rest.
" *31.*—No. 557,159, to P. R. SKINNER. Electrical dental plugger.
" " No. 557,422, to T. W. ONDERDUNK. Electrical dental plugger.
" " No. 557,523, to A. J. BROWN. Dental tool.

THE

DENTAL COSMOS.

VOL. XXXVIII. PHILADELPHIA, JUNE, 1896. No. 6.

ORIGINAL COMMUNICATIONS.

ON THE FORMATION AND STRUCTURE OF DENTAL ENAMEL.*

BY J. LEON WILLIAMS, D.D.S., L.D.S., F.R.M.S., LONDON, ENG.

(The substance of this series of papers was read before the Royal Society of Great Britain on December 12, 1895.)

(Concluded from page 296.)

ON commencing the study of completely formed human enamel under high powers it soon became evident that I had entered an almost unexplored field for investigation. One has only to glance over the recent literature of the subject to see how inadequate, vague, and contradictory are the views held concerning such appearances as are presented in enamel even when seen under low and medium powers of the microscope. The almost complete failure to apprehend the significance of the appearances seen under high powers is largely due, I believe, to the fact that the method of the formation of the tissue has not been clearly seen and comprehended.

Dr. R. R. Andrews, in a recent paper which I have previously mentioned, has described at considerable length certain fibrous appearances to be seen in forming enamel. And while there seem to be errors of no great importance in this paper as to the origin of these fibers, I regard his work as a long step in advance of anything which had preceded it. But Dr. Andrews says of this fibrous net-work or substructure, "When the calcification of the (enamel) rod is complete, the lime-salts have been so densely deposited as to entirely obscure the appearance of any fiber." Again he says, "After the enamel is wholly formed, its (the fibrous net-work) existence seems to be wholly blotted out in the dense calcification of the tissue." Tomes also says, "The individual fibers (enamel-rods or prisms) are to all appearance structureless in perfectly formed human enamel, but a faint transverse striation, fainter but otherwise not unlike that

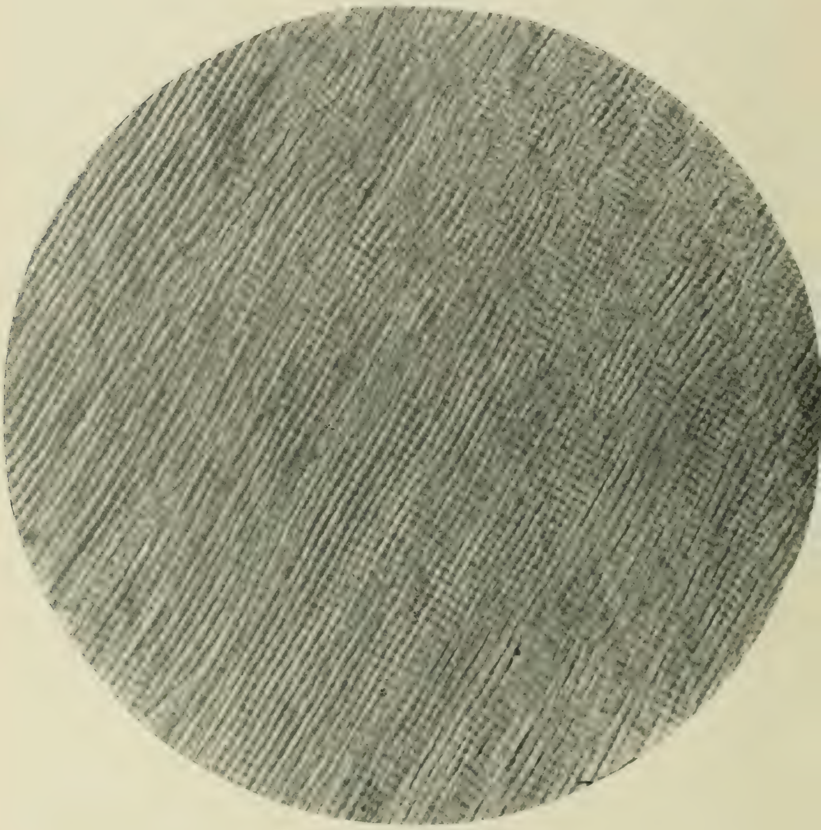
---

* Copyright, 1896, by J. Leon Williams.

of voluntary muscle, is so general that it cannot be regarded as pathological, although it is most strongly developed in imperfect brownish enamel."

Again, "the calcification of the enamel should be so complete that its fibrous* structure is but slightly apparent in longitudinal sections, and the individual fibers should appear structureless with the exception of the feebly marked striation." Sudduth makes no mention of having observed any internal structure in the enamel-rods, and even in those coarser markings, the varicosities, he evidently fails to perceive any direct connection between these markings and the processes of enamel-formation which have produced them. Abbott, in

FIG. 59.



SECTION OF ENAMEL FROM HUMAN TOOTH. × 300.

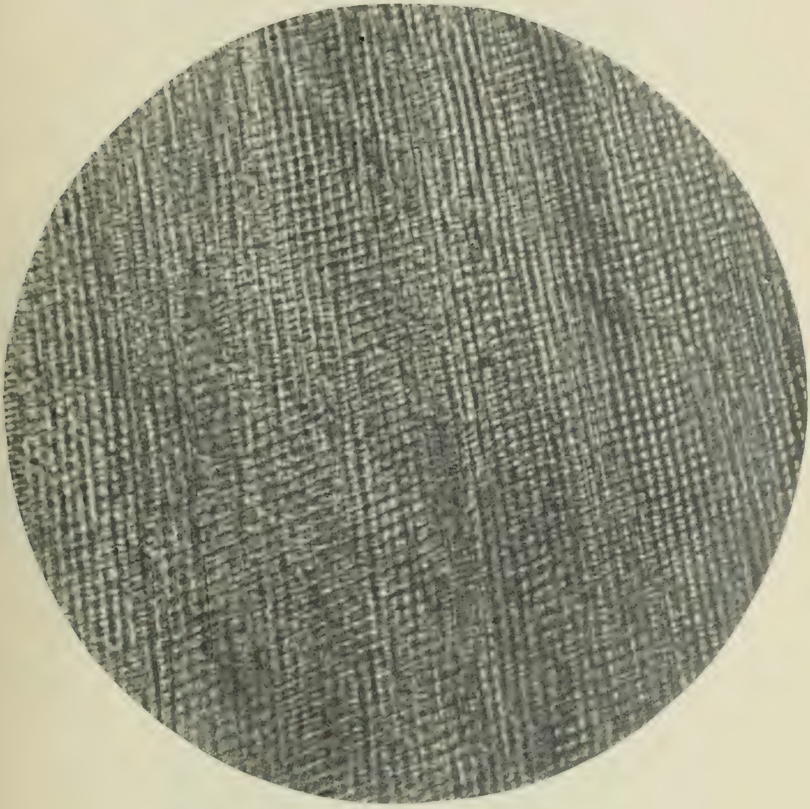
Ground under water while still moist and untouched by acids. Mounted in balsam and photographed immediately. The enamel-rods in some places are seen to lie close together and in other parts to be separated by cement-substance. The transverse markings of the rods are everywhere distinctly seen.

---

* By fibers Mr. Tomes always means the enamel-rods or prisms, and not the finer fibers which are described in these articles.

his recently published work on "Dental Pathology and Practice," gives no hint that he has ever seen the true structure of completely formed normal human enamel. Certainly there is no suspicion of the real structure in the one photograph of enamel which is the only illustration of any value on that subject in the book. Von Ebner claims to have demonstrated the presence of a system of minute canals in enamel, and he believes that the varicosities of the rods is an artificial appearance produced by the action of acids. Bödecker and Abbott *claim* to have seen organic fibers passing between the enamel-rods and giving off thorn-like processes. They have also observed the enamel-rods breaking up into nucleated protoplasmic bodies which may or may not become recalcified. Von Ebner regards these opinions as errors which have grown out of observations made upon improperly prepared specimens. Heitzmann and his pupils retort that Professor Von Ebner's work is to be discredited

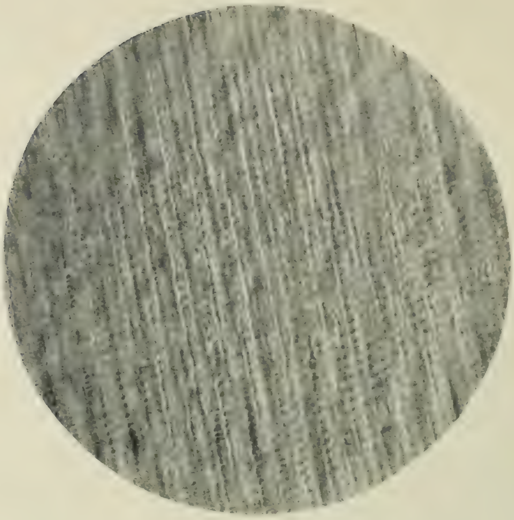
FIG. 60



SECTION OF ENAMEL FROM HUMAN TOOTH. × 350.

Section prepared by Mr. J. Howard Mummery. The transverse markings of the enamel-rods are more pronounced in this specimen than in any I have seen. The enamel-rods are everywhere seen to be united by projecting processes.

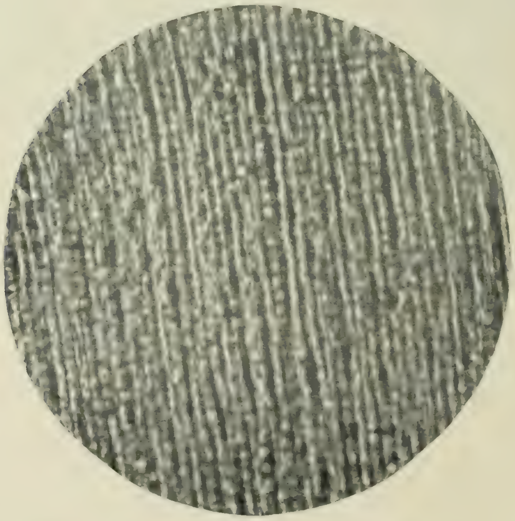
FIG. 61.



SECTION OF ENAMEL OF HUMAN TOOTH. × 400.

Photographed with Ziess apochromatic lens and Powell and Leland apochromatic condenser. The optical parts accurately centered and the focus "critical." The enamel-rods are seen to be resolved into distinct sections (enamel-globules), the cement-substance often passing entirely between the sections.

FIG. 62.

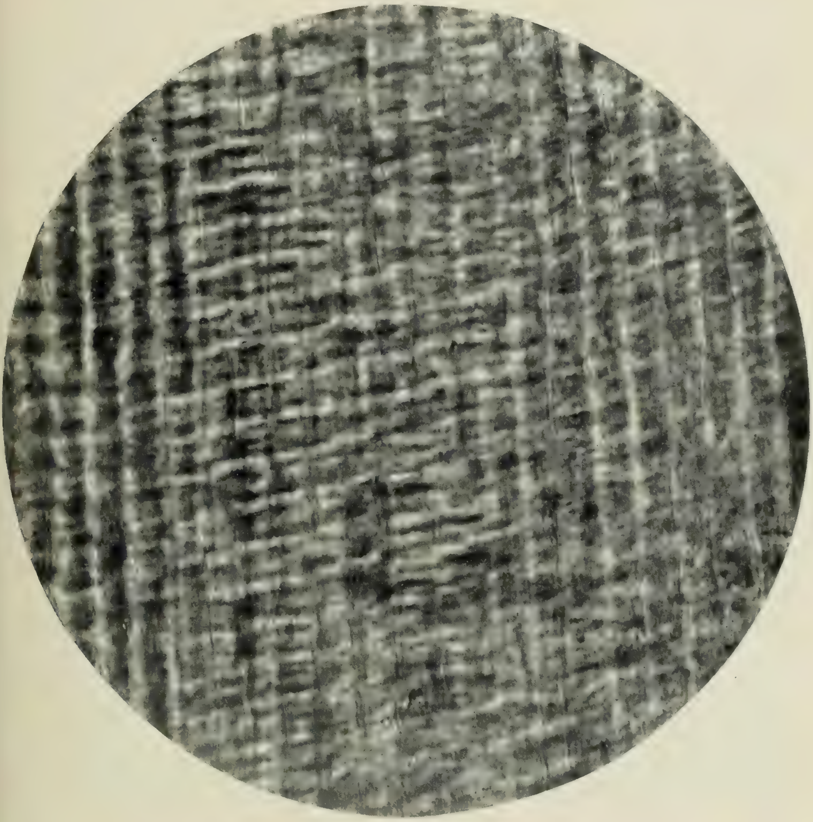


The same field as shown in Fig. 61. The change in effect was produced by racking the condenser down 1-32 of an inch. The perfect resolution of the rods into their component parts as shown in the foregoing illustration has almost entirely disappeared by the slight change in the position of the condenser.

because his opinions are based upon a study of dried or mummified enamel.*

These are specimens of the contradictory teachings and opinions with which the student of dental histology is confronted at the beginning of his work. It is small wonder that we have at present a most chaotic condition in the minds of a majority of the members of the dental profession as to the professed scientific foundation upon which their methods of practice rest.

FIG. 63.



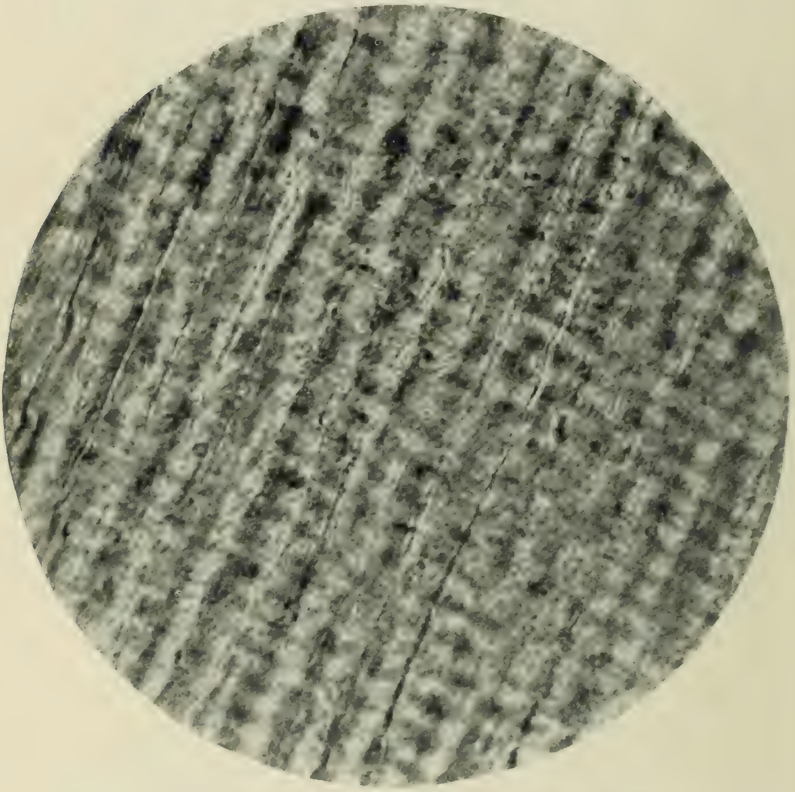
SECTION OF ENAMEL FROM HUMAN TOOTH. × 1500.
Showing marked variation in the structure of the enamel-rods.

The problem is an intensely practical one because, obviously, the methods of practice of the dentist who believes that enamel may become softened or hardened by the abstraction or restoration of a portion of its mineral substance must be quite different from that of one who discredits this view. The former view is probably held by nine-tenths of the dentists of the world, without a single fact for its justification. This mistaken idea of long standing has been so confirmed by the professed scientific teachings of Heitzmann and his pupils that men occupying the highest positions as educators in the dental profession are found ready to dispute and deny the most irrefutable demonstrations. It is time a serious effort be made to break down a position the sole defence of which is a *belief* that has endured for many years. We should no longer profess the least interest in any man's *notion* as to how things are. What can you demonstrate? That is the question. We do not care for the most clever and artistic drawings which, after all, may represent nothing beyond an idea of the mind. You are a student of nature, an experimenter, an investigator. *Show us* what you have seen. It is now a simple, easily demonstrated fact, which finds most abundant proof in this paper, that in histological work it is possible to show, by means of photo-micrography, all that any human eye can see, and to this test all present and future pretended discovery in this field must be brought.

---

* Professor Von Ebner might have replied to this with a challenge to the Heitzmann school to select dried or even fossil specimens of enamel from any given number of microscopical preparations of this tissue.

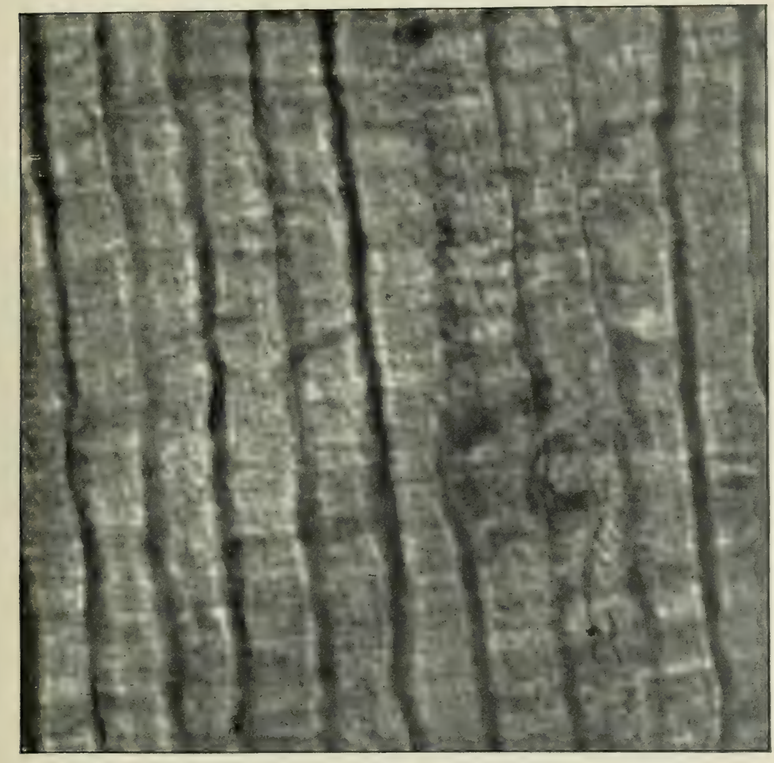
FIG. 64.



SECTION OF ENAMEL FROM HUMAN TOOTH TREATED FOR SEVERAL HOURS WITH LEMON JUICE. SHOWS ULTIMATE GRANULES. × 2000.

I do not wish to deny that there are extreme technical difficulties attending the study of completely calcified enamel. The fact that such acute, unprejudiced, and altogether able observers as some whose names I have mentioned in this paper have failed to detect any definite structure in the substance of the enamel-rod is the best possible proof of the existence of these difficulties. If one were to make an elaborate pattern in clear glass and then imbed this pattern in other glass of lower melting point, the problem of differentiating the pattern of clear glass imbedded in other clear glass would closely resemble the problem of differentiating the structure of completely formed enamel, and this illustration represents fairly well the manner in which enamel is formed. A somewhat elaborate pattern of translucent material is formed by the enamel-cells. Simultaneously or alternately with the formation of this pattern another translucent substance of a more liquid character is formed, which flows or melts together all about the pattern work, and the two become calcified together. The former substance, the elaboration of which is shown

FIG. 65

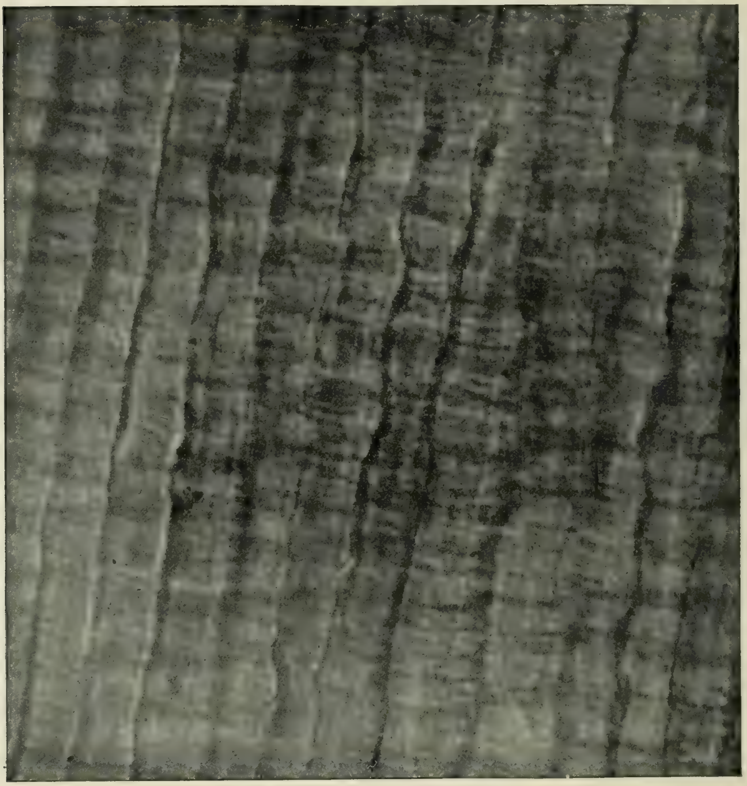


SECTION OF ENAMEL FROM HUMAN TOOTH. × 2.00.

Dark ground illumination. Focused in middle of section to show granular calcified plasm-strings. The transparency of the cement-substance between the enamel-rods is perfectly demonstrated in this illustration, as also in Fig. 66.

in Figs. 41, 44, and 45, builds up the structure of the enamel-rods. The formation of the latter material is seen in Figs. 30, 31, and 38, and from this is developed the cement or interprismatic substance which binds the rods and their varicosities, or the enamel-globules, together. These are the conclusions which we reach from the study of specimens, photographs of which have already been presented. We have now to see what confirmation of this view can be found in completely formed enamel; and we may as well clear away as many of the difficulties as we can at once, and say that while enamel will be seen to have a much more complex structure than has heretofore been supposed, it has no canals as claimed by Von Ebner, nor has it organic fibers as described by Heitzmann, Bödecker, and Abbott; neither is there the slightest evidence that this tissue undergoes that peculiar retrograde metamorphosis which these last-mentioned

FIG. 66.



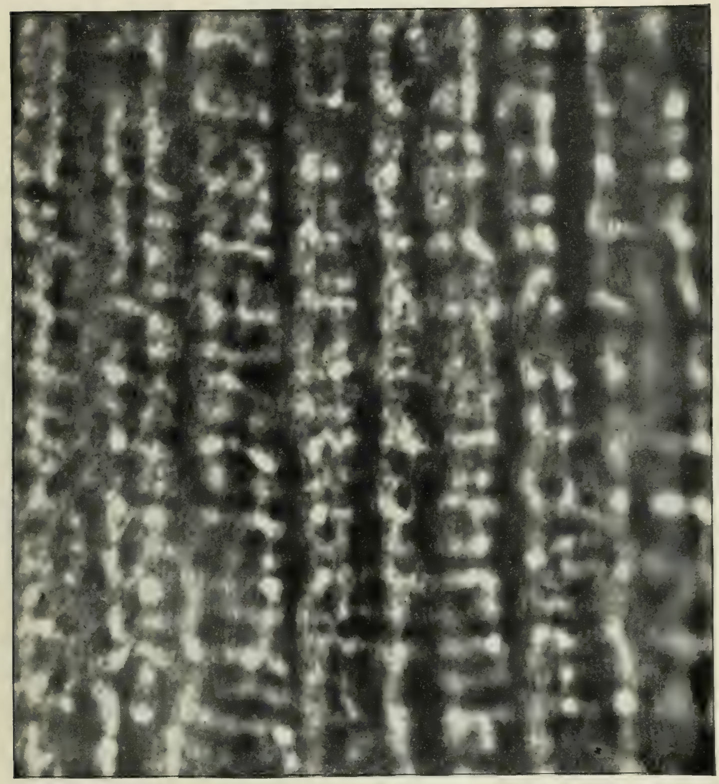
SECTION OF ENAMEL FROM HUMAN TOOTH. × 2000.

Dark ground illumination. The structure of the enamel-rods is here finely shown against a black background. Seen with central illumination of transmitted light under powers of 500 to 800 diameters, the enamel-rods in this specimen appear to be smooth and nearly structureless.

authors have described. In fact, we shall see that there is no possibility of any such changes occurring.

I have but little that is new to offer concerning the appearances of enamel as seen under powers ranging from 150 to 600 diameters. There is, I think, a somewhat greater variety in the arrangement of the enamel-rods and their varicosities, even as seen under low powers, than previous writers have described. The true appearances of the rods and varicosities can never be seen until the specimen has been ground so thin that there is but a single layer of rods. The regular arrangement of the rods in rows or series enables us, if we grind our specimen in the right plane, to produce a section in which the interspaces of the rods are not covered by other rods. (See Fig. 83.) Such specimens will sometimes show the rods lying quite apart from each other with a perfectly clear substance between them. That these light interspaces are not clefts or canals is clearly seen when the specimen is examined under a power of 800 to 1500 diameters. Connecting processes and fine, almost transparent, granules may then

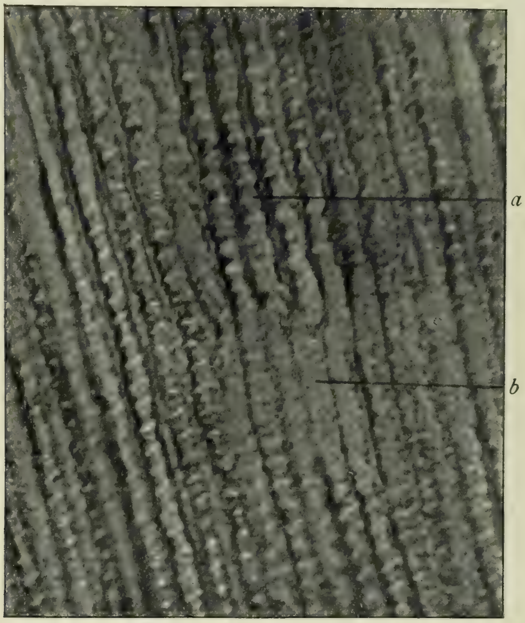
FIG. 67.



SECTION OF ENAMEL FROM HUMAN TOOTH. SPECIMEN TREATED FOR 24 HOURS WITH DILUTE CITRIC ACID. DARK GROUND ILLUMINATION. × 3000.

sometimes be seen in this light substance. In a majority of specimens, however, the enamel-rods are more or less in contact with one another throughout their entire course. The varicosities, instead of interdigitating, as has been described by some writers, are nearly always exactly opposite each other, as I have already mentioned in describing the enamel of the rat, and the rods are nearly always united by the varicosities which touch one another at the points of their greatest diameters or send out processes by means of which they are united to one another. The varicosities in each rod, although sometimes apparently separated by a clear space, are also seen under high power to be connected by processes and calcified plasmic strings.

FIG. 68.

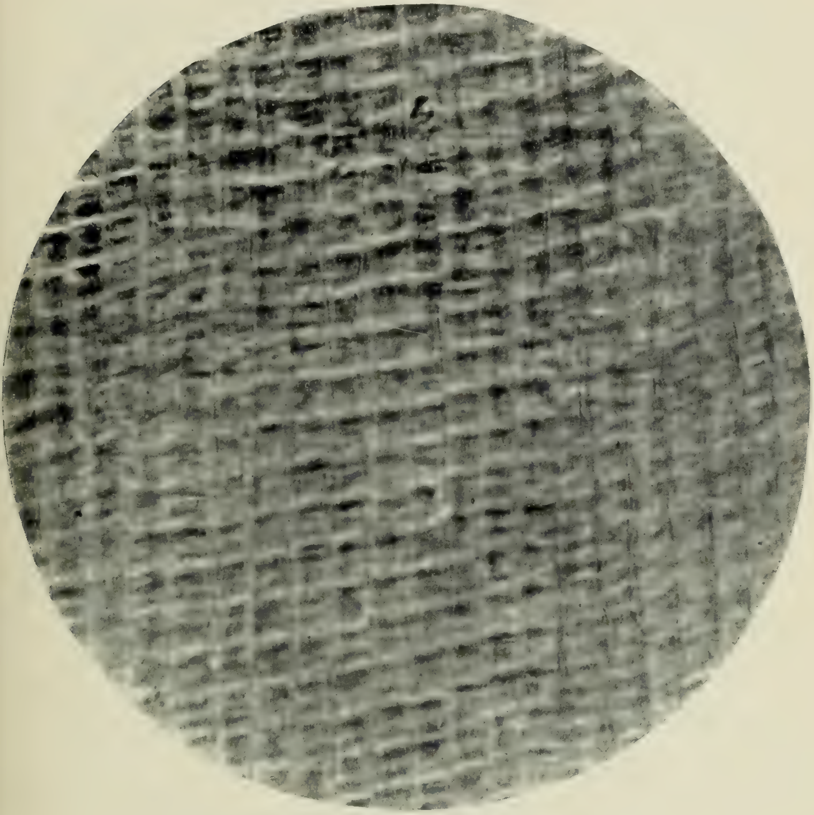


SECTION OF ENAMEL FROM HUMAN TOOTH TREATED WITH DILUTE HYDROCHLORIC ACID. × 1000.

a, Enamel-rods considerably reduced in size by the action of the acid. The enamel-globules or varicosities resist the action of the acid much more than the cement-substance between the rods; *b*, Enamel-rods but slightly acted upon by the acid.

Bödecker's statement that normal human enamel is non-striated is entirely without foundation. The varicosities or globules which form the striations sometimes melt almost completely together, but I have never yet seen a properly prepared specimen which did not show the separate varicosities or striations at some point. In a section of human enamel prepared by Mr. J. Howard Mummery (Fig. 60), the individuality of the varicosities is more strongly marked than in any specimen I have ever seen. The demonstration of the structure of the enamel-rods would have been more perfect if the section had been ground a little thinner, but the specimen is far too valuable to risk re-grinding. On one side of the illustration the rods are seen to lie quite apart from one another, but to be everywhere connected by processes which pass across the clear space between the rods. In this, and in nearly all of the illustrations which accompany this section of my paper, the varicosities are seen to lie exactly opposite one another, thus demonstrating my former statement that they are produced by a simultaneous deposit of enamel-globules over the entire surface of the forming tooth. The varying disposition of the rods near the line of union of the enamel with the dentine, their curved and twisted arrangement on the cusps of the molars and bicuspids, and their almost uniformly straight course near the surface on the incisors, all of these features have been accurately described by Tomes and others, and it is not necessary that I should now go over this ground again. It would seem as though these different

FIG. 69.



SECTION OF ENAMEL FROM HUMAN TOOTH. × 1500.

From Mr. J. Howard Mummery's collection. The sections of the rods are slightly separated by cement-substance on their vertical aspect, but are in actual contact on the perpendicular sides. Refraction from the sides of underlying rods gives the effect of fibers between the rods.

arrangements of enamel-rods must be produced by oscillatory or rotatory movements of that part of the tooth-germ lying beneath the enamel-organ or of such movements in the enamel-organ. But this is a mere speculation, as I have no data on which to found an opinion. In the study of no tissue or substance under the microscope is it more important to have every part of the optical apparatus in critical focus and centering than in the examination of enamel.

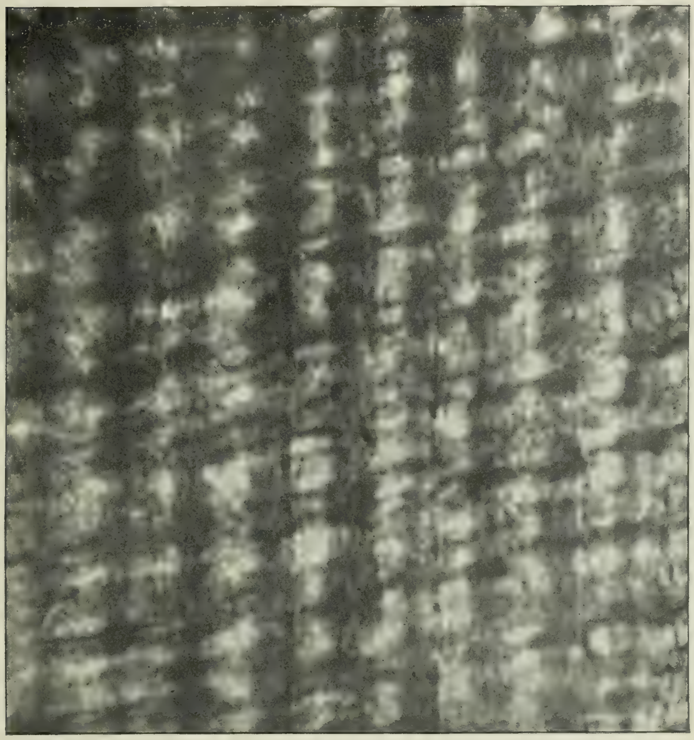
Fig. 61 is from a photograph of human enamel under a power of about 400 diameters, with Zeiss apochromatic objective and Powell and Leland's apochromatic condenser, in critical focus and centering. Fig. 62 is from a photograph of precisely the same field. Nothing was moved except the condenser, which was racked down about $\frac{1}{32}$ of an inch. If so marked a difference in appearance as is here shown can be produced by so slight a change in the adjustment of the best optical apparatus that can be made, one need not go much farther to find one important reason for the wide divergence of opinion concerning the structure of enamel. It is doubtful if any one can be certain of the true structure of enamel until, with perfect command of the best apparatus, he has made many attempts to photograph this substance under powers ranging from 1000 to 3000 diameters.*

Human enamel presents a much greater variety of appearances than that of any animal which I have examined. These differences may all be broadly arranged in two groups or classes. Arranged in one way, the differences have relation to the evenness and solidity of the enamel-rods. Standing at one end of this group we have enamel which shows the varicose markings or striations of the rods but slightly or not at all. This is more frequently found next the dentine than on the outer surface. In this form of enamel-rod there has been a more complete coalescence of the enamel-globules, due, perhaps, to a more fluid condition of the elements of which enamel is formed at the commencement of the process. As we approach the surface of enamel the globules which constitute the varicosities of the rods retain their individual character more completely, and are sometimes entirely separated except by the slight connection of a few calcified plasmic strings. In such cases the interprismatic cement-substance which separates the rods also flows about and between the varicosities or globules, and the whole thus becomes calcified. A second grouping of the differences observable in the structure of enamel has relation to the more minute detail seen under high powers,—what we may call the ultimate structure of the varicosity. At one end of this group we have the calcified plasm-strings running along the rods of which I have spoken in describing the enamel of the rat. At the other end of this group we have enamel the ultimate structure of which is composed of very fine granules more or less regularly arranged, and intermediate between these extreme forms we find the granules grouped in thread-like arrangements often looking like beads on a string. These calcified strings of granules probably arise from the plasmic net-work seen in the ameloblasts in Figs. 28, 29, 52, and 53. In fact, the continuity of the plasm-strings or threads between the ameloblasts and the forming enamel may often be seen, as

---

* Professor Heitzmann and his pupils, particularly Drs. Bödecker and Abbott, have, during the past fifteen years, laid great stress upon their claims to the discovery of a minute structure of living organic matter in enamel. They have urged that this reticulum of living matter is only to be seen under magnifying powers of 600 to 1000 diameters. Accompanying this paper I show a large number of photographs of normal human enamel under magnifying powers ranging from 1000 to 3000 diameters. A comparison of these photographs with the illustrations which have accompanied the papers published by Drs. Bödecker and Abbott will satisfy any one of the misleading and erroneous character of the work of these authors. Those of us who have long been familiar with these errors did not attach any special importance to the "vain imaginings" of the Heitzmann school until those errors received the indorsement of the National Association of Dental Faculties. That action removed the entire question beyond the realm of personal controversy. It has now become a matter of national importance to the dental profession in America, and the question is, Are dental students in the United States to be taught theories of dental histology which are only mentioned by scientific men of standing, the world over, with contempt or ridicule? Let it be distinctly understood that it is not a matter of opinion, but of fact, and it is facts which the National Association of Dental Faculties of the United States have to face in considering whether they will withdraw their indorsement of a book, scarcely a page of the histological work of which is free from some statement that the dental student will not have to unlearn.

FIG. 70.

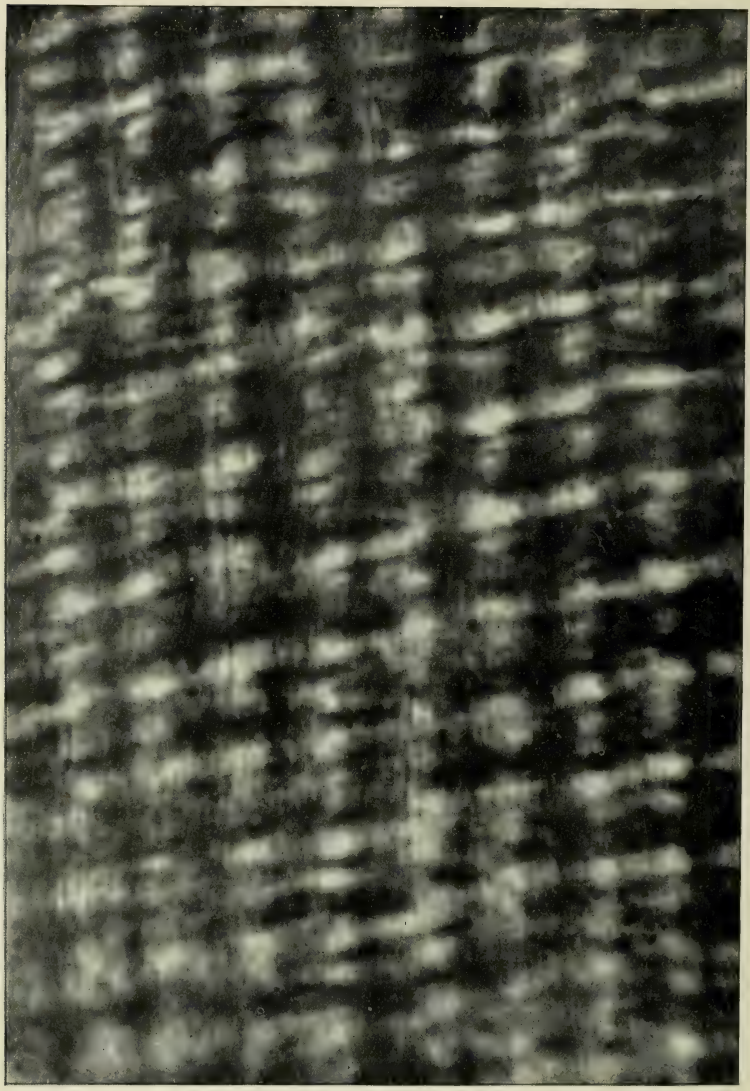


LONGITUDINAL SECTION OF HUMAN ENAMEL FROM SURFACE OF INCISOR. × 2000.

The enamel-globules or sections of the rods are more distinctly granular than in Fig. 71, in which illustration the calcified plasm-strings are more in evidence.

I have shown in Fig. 22. These granular strings are often larger or, at least, more clearly defined on the extreme margin of the enamel-

FIG. 71.

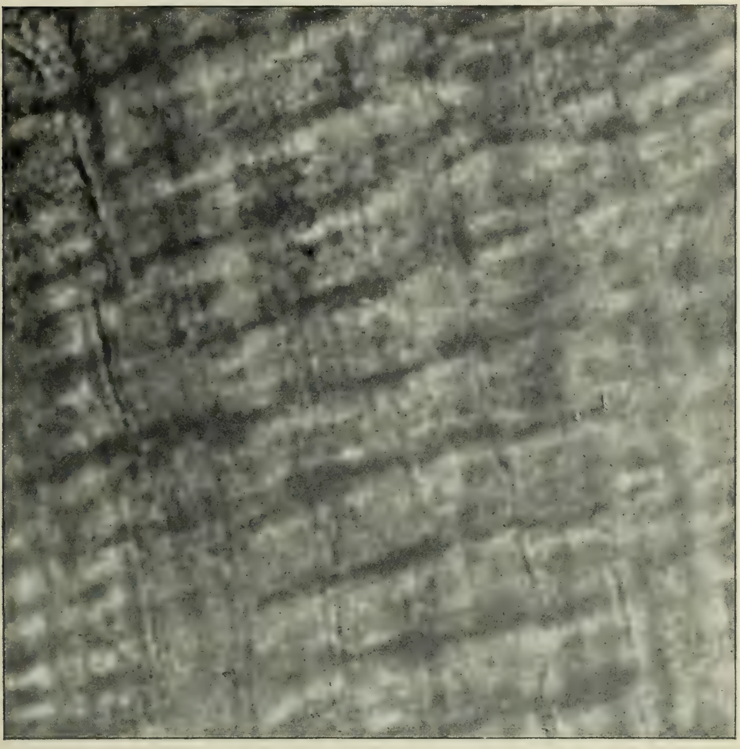


LONGITUDINAL SECTION OF ENAMEL FROM OUTER SURFACE OF HUMAN INCISOR. × 3000.

The structure of the calcified enamel-globules of which the rods are composed is very finely shown in this illustration. This section represents normal human enamel of the finest type. The demonstration of the action of acids upon enamel makes it perfectly clear why enamel of this sort is more resistant than that shown in Figs. 65 and 66 But the difference in time required for the complete destruction of different kinds of enamel by acids goes but a short way toward explaining the slowness or rapidity of decay of the teeth as it occurs in the mouth.

rods, as shown in ground sections. It is probably these especially distinct calcified plasm-strings that Bödecker and Abbott have mistaken for organic fibers. The ultimate granular structure of enamel is often more clearly seen in sections which have been subjected for a short time to the action of a weak acid. Figs. 63 and 64 are from sections which were exposed for several hours to the action of lemon-juice. The acid, with reference to the substance of the enamel-rods, seems to act more rapidly on the threads connecting the granules, causing these connecting lines to disappear to a greater or less extent, and thus leaving the granules isolated and more distinct to sight. The form, structure, and relation of the enamel-rods is beautifully shown in Figs. 65, 66, and 67, which are from sections photographed under very high powers and in a manner to give the effect of dark-ground illumination. Fig. 68 was exposed for several hours to the action of a weak acid, and the illustration shows very plainly that

FIG. 72.



LONGITUDINAL SECTION OF HUMAN ENAMEL. × 3000.

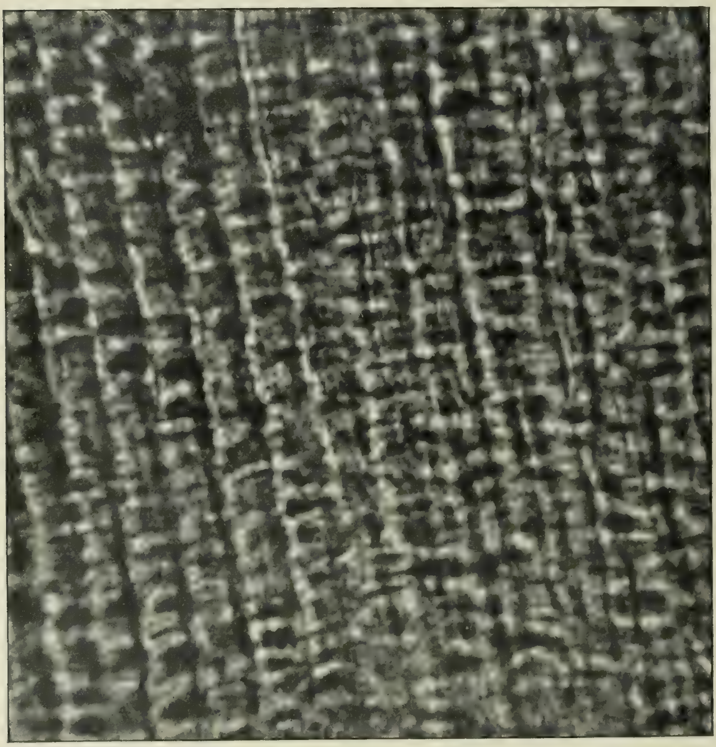
From Mr. J. Howard Mummery's collection. There are several remarkable features in this specimen. The sections of the enamel-rods are almost exact cubes in shape, and are seen to lie very close to one another. The granules in two of these sections at the upper left corner are shown arranged in a regular order, as they are sometimes seen in both ameloblasts and odontoblasts. The enamel-rods are everywhere in actual contact.

the substance of the enamel-rod offers a much greater resistance to acids than the interprismatic cement-substance.

The amount of cement substance in enamel varies considerably, not only in different specimens, but also in different parts of particular specimens. Sometimes the enamel-rods are in actual contact, and again they are separated by spaces equal to a fourth or a fifth of the diameter of the rod.

Figs. 69, 70, 71, and 72 show with diagrammatic clearness the ultimate structure of enamel, and also the manner in which the rods are built up by the successive deposit of the bodies formed in the ameloblasts. The outer portion of enamel on human teeth most frequently shows this kind of structure, and the enamel on the teeth of rodents is built up throughout in this manner. It probably represents the structure of enamel most resistant to mechanical and chemical action. The bodies of which the enamel-rods are built up, although nearly separated from one another by cement-substance, are

FIG. 73.

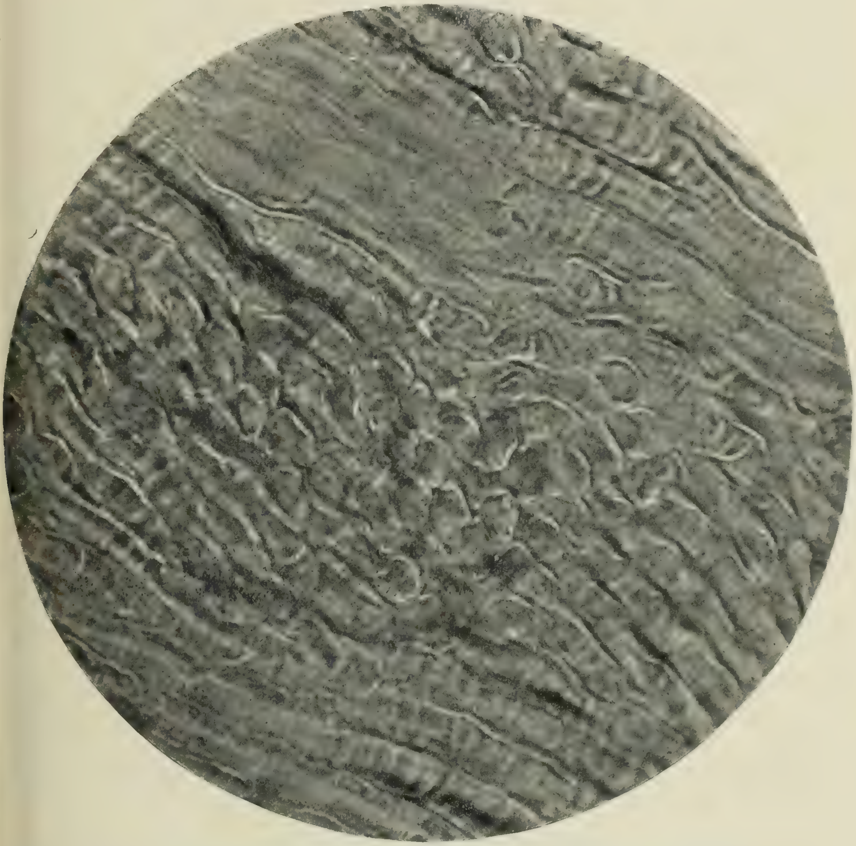


LONGITUDINAL SECTION OF ENAMEL OF HUMAN TOOTH, SHOWING FIRST STAGES OF CARIOUS DECALCIFICATION. ACTUAL STRUCTURE OF THE ENAMEL-RODS MORE CLEARLY SHOWN BY SOLUTION OF THE CEMENT-SUBSTANCE. × 2000.

also everywhere united both laterally and vertically by processes and granule strings.

Probably the so-called varicosities or enamel-globules of which the rods are constructed are rarely completely melted into one another, but are separated by a thin layer of cement-substance. For instance, the rods in Fig. 66 under low and medium powers appear smooth, homogeneous, and continuous. But a lens having a numerical aperture of 1.40, used with an optical combination magnifying 2500 diameters, resolves the rods more or less completely into their structural elements. As I have already shown in Fig. 68, the cement uniting the rods yields more quickly to the action of acids than the substance of the rods; so in decay of enamel we not only find that the rods become separated first by the action of the acid of decay, but also that the original enamel-globules and plasm-strings reappear in the rods with great distinctness. This reappearance is caused not, as supposed by Heitzmann, Bödecker, and Abbott, by a structural

FIG. 74.

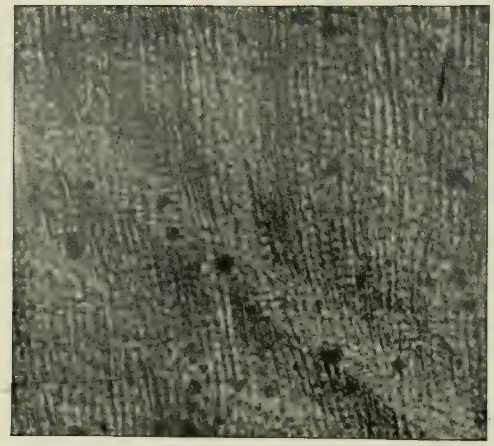


SECTION OF ENAMEL FROM HUMAN TOOTH NEAR LINE OF UNION WITH DENTINE. SHOWS ENAMEL-RODS IN BOTH LONGITUDINAL AND TRANSVERSE SECTION. × 1000.

change in the enamel, but simply by the melting away of the calcified cement-substance which, in completely formed enamel, everywhere surrounds and partially conceals the true structure of the rod. In the carious disintegration of enamel appearances are often shown which bear a striking resemblance to those observed in the processes of enamel-formation, as may be seen by referring to Fig. 73, which is photographed from a field just on the borderland of decay.

This link completes the chain of evidence of the method of enamel-formation. We are now able to show from a great number of specimens of developing enamel, mature normal enamel, and enamel in various stages of carious disintegration, that the enamel-rods are built up by the successive deposit of bodies formed in the enamel-cells and possessing a more or less definite organization. These bodies are connected vertically by plasmic strings of granular origin, which pass through the entire length of the rods. The strings may be seen during the development of enamel in the ameloblasts, and also passing from these cells into the forming enamel-rod. The globular bodies of which the rods are built up are also seen to be united to one another and to the bodies of contiguous rods by radiating processes. Into this organic skeleton which forms the true structure of enamel there is further deposited a translucent substance of syrupy consistence, and probably consisting chiefly of calcoglobulin. This substance flows about the organic globules and the developing rods, and the entire mass becomes so completely calcified that in normal mature enamel there is left no trace of organic matter.

FIG 75.

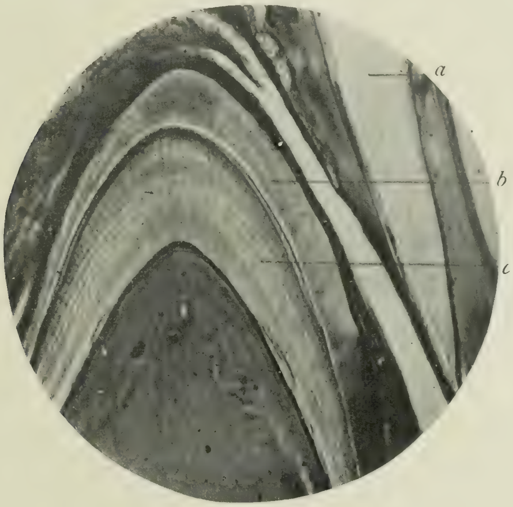


SECTION OF ENAMEL OF HUMAN TOOTH GROUND UNDER WATER AND MOUNTED IN NEUTRAL GLYCEROL. × 300.

Shows brown bands of Retzius and enamel-globules of which the rods are composed. The section from which this photograph was made was cut from a tooth taken from the mouth of a woman sixty years of age. It was the first tooth the patient had lost, and was extracted because of extreme looseness. It was quite free from decay, and the enamel therefore must be considered as normal and perfect in structure.

Only the original *form* remains duplicated in mineral substances like a fossil. Microscopic examination and study supplement in several ways the evidence recently given by Mr. Charles Tomes's chemical analyses, that normal human enamel contains no organic matter. There is the *a priori* evidence which I long ago pointed out in the fact that the formative and nutrient organ of enamel completely disappears previous to the eruption of the teeth. There is the further and more conclusive evidence which we find in the complete failure of response in enamel to the action of the most delicate stain tests for organic matter. Orseille far exceeds in sensitiveness and rapidity of action any stain that I know of as a test for organic matter in dentine and bone. Dentine is deeply stained by it in ten minutes. The prolongations of the dentinal fibrillæ which we find in the enamel of marsupial teeth are deeply stained in twenty to thirty minutes. I have repeatedly exposed normal human enamel to this stain for forty-eight hours without getting the faintest reaction. Chlorid of gold, which Heitzmann and his pupils have chiefly used as a stain for dentine and enamel, is totally unreliable and misleading. It is possible to duplicate and to demonstrate many of their errors of interpretation, some of which have undoubtedly been due to the use of this material. Enamel which has been acted upon by acids will always contain furrows between the enamel-rods and also between the varicosities, because of the less resistance of these parts to the action of the acids. Some portion of the gold chlorid adhering in the furrows or crevices thus formed is reduced by the subsequent

FIG. 76.



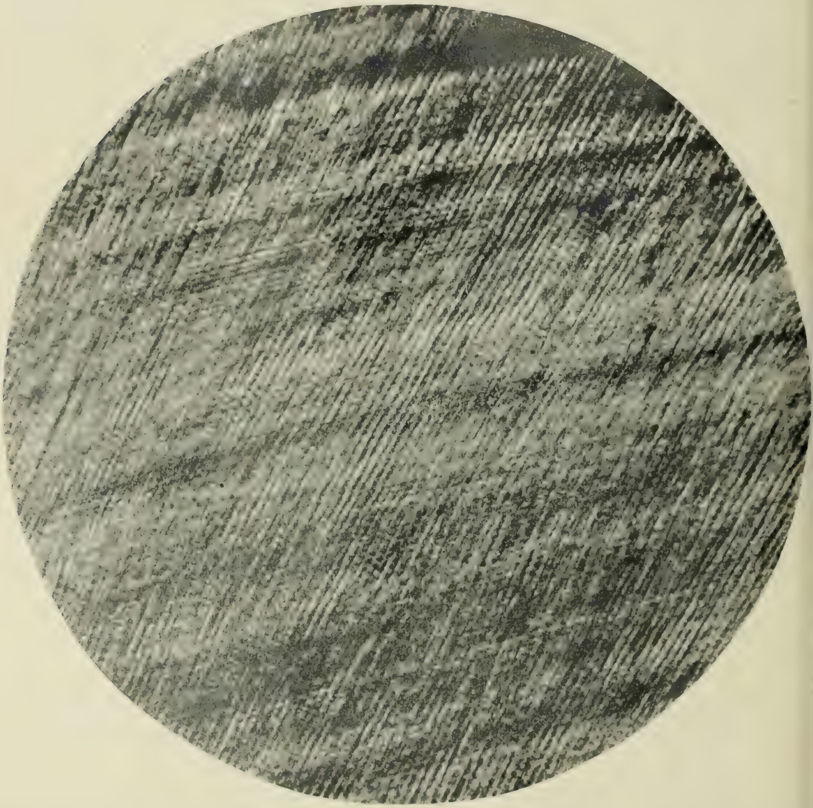
SECTION OF JAW OF YOUNG MONKEY RECENTLY CAPTURED, SHOWING ROOTS OF TEMPORARY TOOTH AND CROWN OF DEVELOPING PERMANENT CUSPID. × 20.

a, Root of temporary premolar, showing stratification of dentine; *b*, Enamel of permanent cuspid tooth, showing stratification; *c*, Dentine also showing stratification. Neither stratification nor pigmentation can be considered abnormal or anomalous, as these phenomena are the rule rather than the exception in the teeth of most wild animals.

action of the light, and this it is which has probably given rise to the organic enamel-fibers of Abbott and Bödecker. An appearance of fibers and net-work may be produced in *mineral* specimens by treating them with chlorid of gold, the metal becoming deposited in minute crevices, as described above.

An appearance of fibers may also be produced by other methods of manipulation, but no one who is thoroughly familiar with microscopic technique would be deceived by such appearances. Deceptive phenomena of this sort occur most frequently in specimens which are more than the thickness of the diameters of a single enamel-rod. Light refracted from the edges of underlying enamel-rods will often give the effect of fibers, and certain arrangements of the very narrow spaces which sometimes show between the varicosities will add to this phantom fiber the appearance of thorn-like projections or processes. Keeping in mind the fact that in a large proportion of specimens of normal human enamel there are probably from fifteen to twenty

FIG. 77.

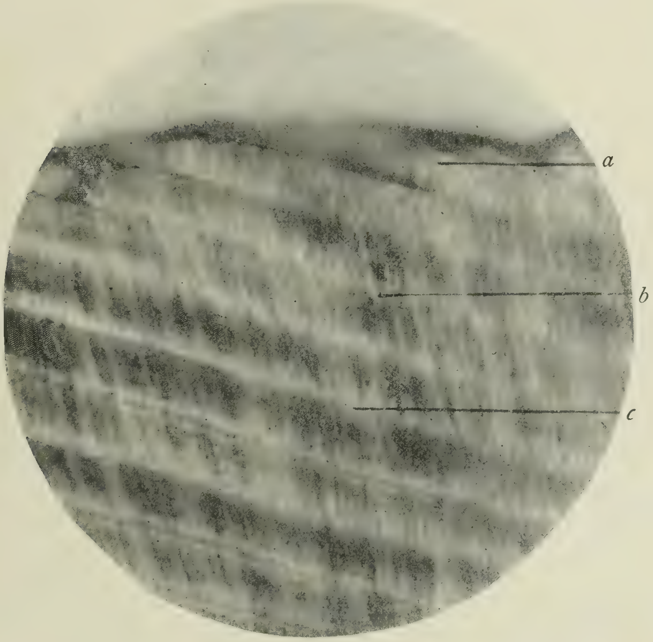


LONGITUDINAL SECTION OF HUMAN ENAMEL, SHOWING LINES OF STRATIFICATION PASSING BETWEEN EACH LAYER OF GLOBULES. POLARIZED LIGHT. × 300.

calcified plasmic strings to each enamel-rod, and that these strings are often granular or beaded, we can easily see how the action of acids would expose the outermost calcified plasmic strings of the enamel-rods and thus bring them more clearly into view, as I have already shown. Here again we should have an appearance which might easily be mistaken for a fiber passing between the enamel-rods. Many such appearances are shown in the illustrations accompanying this paper. Bödecker and Abbott have evidently failed to see more than the outermost of these calcified plasm-strings; hence their mistake.

Several years ago I pointed out the curious and significant fact that in none of the drawings which Heitzmann has made to illustrate the articles of his pupils has he shown the "organic" enamel-fiber in *cross-section*, presumably for the very good reason that it does not appear, because the probable sources of error which I have mentioned do not apply to *cross-sections*.

FIG. 78.

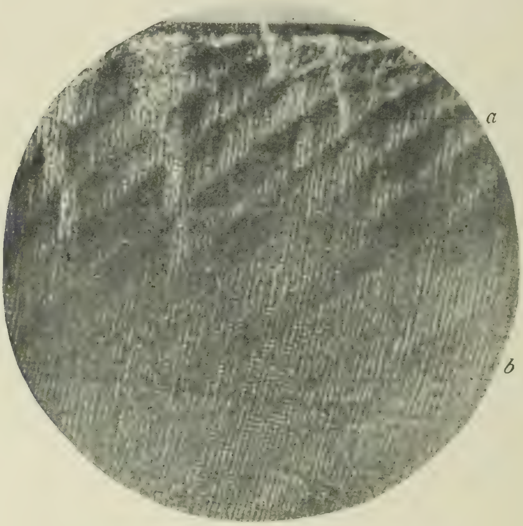


SECTION OF ENAMEL FROM HUMAN TOOTH. × 300.

Polarized light. Focused on the exact surface of the enamel to show the surface endings in furrows of the fan-like groups of enamel-rods. *a*, Furrow on the surface of enamel between two groups of enamel-rods; *b*, *c*, Brown stripes of Retzius. The ends of the enamel-rods in this section are ground off at the upper surface of each stripe.

We are now in a position to clearly understand, for the first time, the striation and stratification of enamel. Many and widely different theories have been advanced to explain these appearances. Von Ebner says that the striated appearance of the enamel-rods is probably due to the action of some acid, and Abbott, in his recent book, says "normal enamel is non-striated." This statement is, of course, necessary to the theory which he is vainly endeavoring to maintain. One cannot avoid wondering what methods these gentlemen have employed in the preparation and examination of enamel, if the appearances have led them to make such statements. I have never yet found a specimen of normal human enamel which did not show striation. Striation appears in the teeth of most animals, and is especially marked in the very fine enamel of the teeth of rodents. I have recently cut and ground specimens from the fossil tooth of a mastodon in which the striations of the enamel-rods are beautifully shown. So far from striation and stratification being an indication of aberrant or anomalous formation, as claimed by Bödecker and Abbott, I have found these phenomena almost always present in enamel of the most perfect structure, as in the teeth of various wild animals.

FIG. 79.



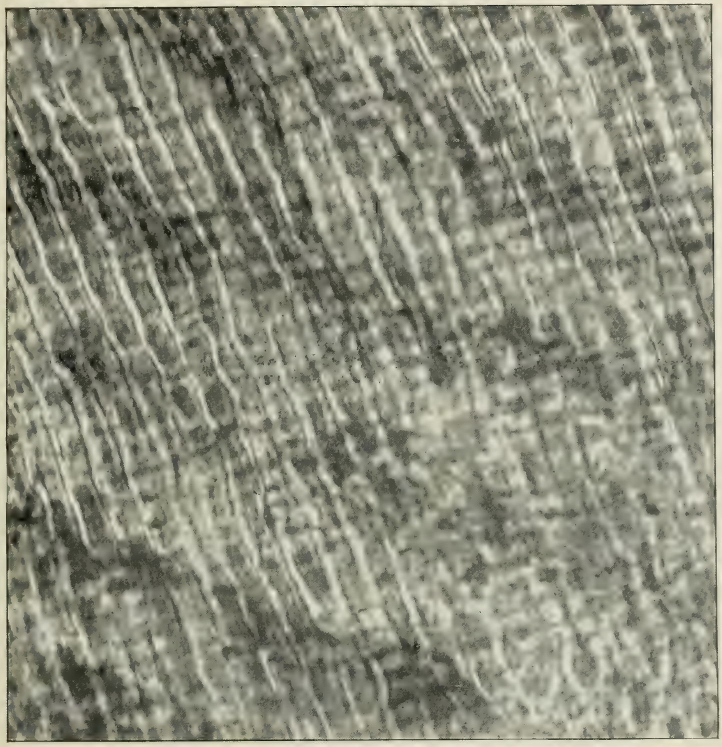
SECTION OF ENAMEL FROM HUMAN TOOTH. × 200.

Showing enamel-rods with transverse striæ or varicosities, and brown bands of Retzius. The enamel-rods in this section are not ground off at the upper surface, as in Fig. 78, but pass through the bands without break in their continuity. *a*, Brown bands of Retzius; *b*, Enamel-rods showing varicosities.

And this is just what we should expect, now that we know that such appearances are simply the record of the method of the formation of the tissue. As for Von Ebner's contention that striation is due to the action of some acid, I show in Fig. 75 a specimen which was ground under water immediately after extraction, mounted in perfectly neutral glycerol, and photographed within thirty minutes from the time it left the mouth. It plainly shows both striation and stratification. Unfortunately, in my haste to get it photographed as soon as possible after extraction, I neglected to carefully cleanse it from dirt-spots; and the photographic lens is so inartistic that it rejects nothing.

Stratification of both enamel and dentine is so frequently met with in the teeth of nearly all animals as well as in human teeth, that it cannot be regarded as anomalous. In fact, in its most typical form, in which the lines of stratification appear between each layer of the enamel globules or varicosities as they are deposited, it may be regarded as indicative of the greatest perfection in enamel-structure. It shows that the material for enamel building has been deposited with the greatest order and regularity. Its appearance in completely formed enamel is probably due to a greater or less difference in color between the enamel-globules and the cement-substance. Stratification appears more frequently as broad bands, the lines of which always correspond to the incremental order. Von Ebner is entirely mistaken in supposing that these bands are due to imprisoned air or gas which has entered the ground-off ends of enamel-prisms or rods through minute canals. First, because the supposed canals have no existence; secondly, because the ground-off ends of enamel-prisms do not appear except where the section of enamel is ground at a cer-

FIG. 80.

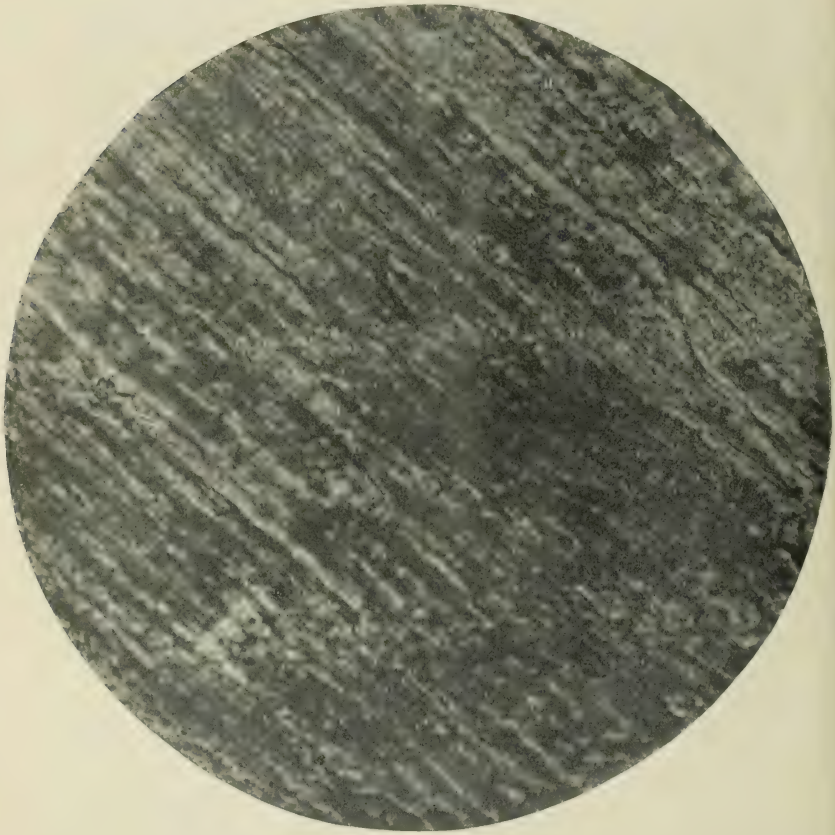


LONGITUDINAL SECTION OF ENAMEL FROM HUMAN TOOTH. × 1000.

Shows enamel-rods passing through Retzius bands without break of continuity. The rods are separated by rather more than the normal amount of cement-substance, and show imperfect formation in lower right-hand corner.

tain angle. Fig. 78 shows a section in which different groups of enamel-rods are ground off at regular distances from the surface, while in Fig. 79 the rods pass through the colored bands without break of their continuity. The continuity of the rods is more clearly shown in Fig. 80. It is plainly seen in this illustration that the colored bands must be due to a pigmentary deposit. Another evidence that they are not due to air or gas is found in the fact that they appear just the same in moist as in dried specimens.

FIG. 81.



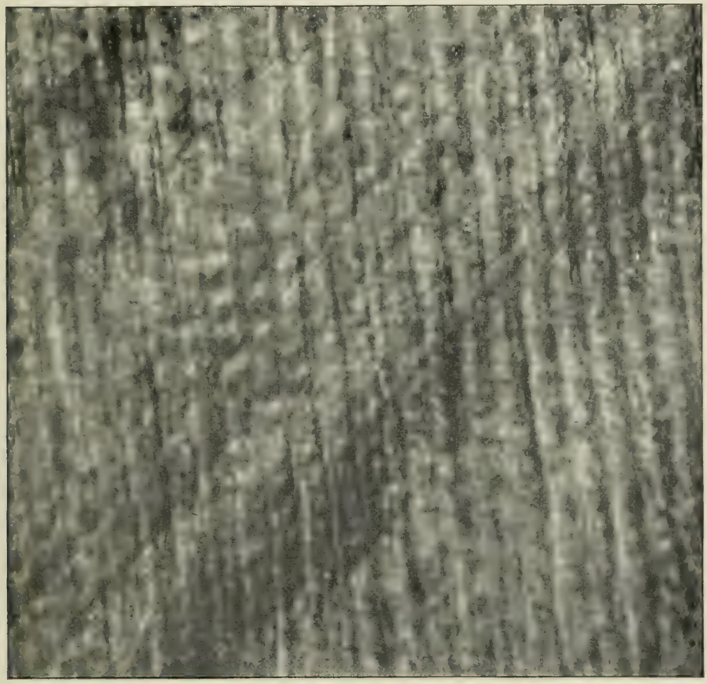
LONGITUDINAL SECTION OF HUMAN ENAMEL. DEEPLY PIGMENTED AND COARSELY GRANULAR. GROUND FROM A "WHITE SPOT" IN INCISOR. × 1000.

Pigmentation and granulation of enamel are not necessarily evidence of imperfect formation. The ultimate structure of all enamel is granular, as I have abundantly demonstrated in this article, and pigmentation is frequently found in the most perfect enamel. At the same time it is true that coarse and deeply colored granulation is characteristic of certain phases of imperfectly formed enamel.

As a future paper is to be devoted to imperfections in enamel-structure, the subject will not receive further consideration here.

The conclusions which we may reach from the photographic evidence I have presented in this series of papers concerning the formation and structure of dental enamel may be summarized as follows: The formation of enamel is essentially a secreting process, as is shown by the development of secreting papillæ in the so-called *stratum intermedium.* There are two distinct products of the enamel-forming organ. One of these products, from which the enamel-rods are built up, is formed in the ameloblasts and is probably a direct nuclear formation. In the enamel-cells it takes the shape of globular bodies containing granules sometimes arranged with more or less order so as to resemble the nucleus of the cell. In the formed enamel-rod these globular bodies are more or less compressed into disk-like shapes, and are sometimes nearly or quite melted into one another. Simultaneously or alternately with the deposit of the globular bodies a translucent, albumen-like appearing substance is seen passing out of the ameloblasts. This substance is probably taken from the blood by the secreting cells of the *stratum intermedium*, and evidently contains

FIG. 82.

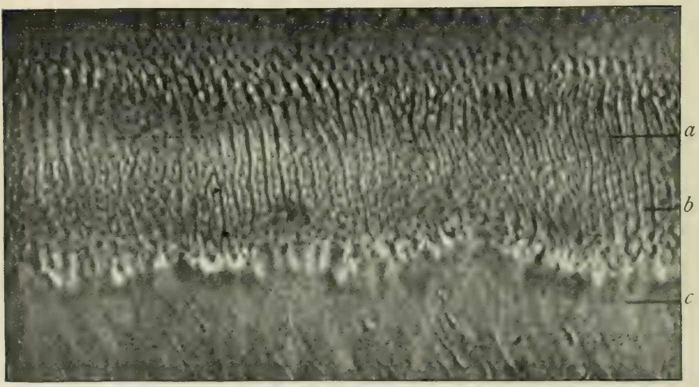


LONGITUDINAL SECTION OF HUMAN ENAMEL. × 1000.

Polarized light. Shows enamel-rods passing through Retzius bands. Ultimate granules well shown.

the mineral matter of which the completed enamel consists. As the globular bodies pass from the ameloblasts they are seen to be connected by plasmic strings, which strings can often be plainly seen in the body of the ameloblasts. The globular bodies are also often connected laterally by strings or projecting processes. Around the skeleton thus formed, which constitutes the real structure of enamel, the albumen-like substance flows, supplying the cement-substance and probably the mineral matter for the calcification of the whole. All of this structure can be plainly seen in mature enamel, but in normal enamel it is everywhere completely calcified and containing no trace of organic matter. No physiological change, therefore, is possible in completely formed enamel.

Fig. 83.



Section of Developing Tooth of Embryo Lamb. × 500.

Section cut transversely to show arrangement of enamel-rods in groups. This section also shows how longitudinal sections may be so ground that when the section is considerably less in thickness than the diameter of a single enamel-rod, there shall be no underlying rods to disturb a perfect view of the structure. The true structure of enamel-rods can only be clearly seen when the sections are ground in accordance with the above suggestions.

a, Cement-substance between groups of enamel-rods; *b*, Ends of enamel-rods or rods seen in transverse section; *c*, Dentine.

Enamel is a solid mineral substance, and the finest lenses reveal not the slightest difference between enamel ground moist from a living tooth and that which has laid in the earth for a hundred centuries.

THE X RAY AND ITS APPLICATION IN DENTISTRY.

BY WILLIAM JAMES MORTON, M.D., NEW YORK, N. Y.

(Address at a special meeting of the New York Odontological Society, April 24, 1896.)

Mr. President, Fellow-members of the Odontological Society, and their Guests: I regret that, as appears from the letters just read, Mr. Tesla and Mr. Edison, those great lights of the X ray, will not be with us to-night; but if you knew how much work the X ray has entailed upon those who have attempted to follow it into its darkened recesses, you would not wonder that anybody would be willing to stay at home, either to rest or to do some new work. The work is never ended. It is a pursuit that is most fascinating, and yet never seems to come to a finality.

I do not intend to take up your time with any abstruse idea of the subject. I have prepared a little paper as a record, which we all like to have for our meetings, and then I propose to give some demonstrations of the X ray, and perhaps it would interest you to actually take a picture before your eyes and have it developed on the spot ; then we have some fluoroscopic demonstrations to make, which I trust will be visible to you, and we will show some lantern slides which demonstrate the work done and recorded by the X ray, and will then speak of the X ray in relation to its use in dentistry.

When the astronomer discovers a new star he adds nothing to the actual facts of nature, for the star has always been in existence ; but he adds something to the sum total of human knowledge, for the existence of the star had not, until then, been known. So it has been with the X ray. Those who worked with excited high vacuum tubes, called Crookes tubes, had this ray or radiation ever about them; but they failed to note or discover its existence. But at length comes along an observer who, intentionally or by accident, arranges a mechanism to detect the hitherto undetected stream, and behold the world is illumined, not as by a torch which flares from its mountain tops but as by a new sense of perception, which enables its possessor to see into solid matter. The covered becomes uncovered, the concealed stands revealed, the invisible is visible ; man may see and study his own skeleton, the surgeon may watch and count by aid of his eyesight alone the beatings of the heart.

No wonder that not only the scientific world, but also all the thinking human race have been captivated by this marvel

It is therefore with great pleasure, fellow-members of the Odontological Society, that I bring the subject before you to-night in a brief and elementary manner, and ask you to witness both the general methods of producing the X ray and some of the results of its work registered on sensitive plate and upon fluorescent screen. And it may prove, as the evening's work progresses, that we shall find that the X ray possesses an unusual interest for the dental profession. Indeed, I am of the opinion that it may prove of equal, if not greater, interest to the dental than to the general surgeon.

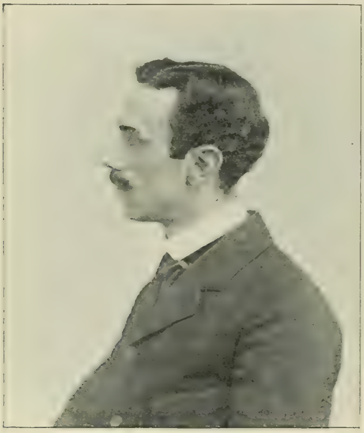
HISTORICAL.

As far back as 1819 the illustrious Faraday, after pointing out the familiar classification of matter into solid, liquid, and gaseous, advanced the then remarkable hypothesis that a further and fourth state existed, and this he termed "radiant matter." In 1879 Professor William Crookes recalled this speculation, and in a series of epoch-making papers and experiments demonstrated that, apparently, matter actually did exist in a fourth state or condition which was as distinct "from the state of gas as a gas is from a liquid."

Up to Crookes's time vacuum tubes whose vacua were comparatively low were in familiar use ; they were called Geisler tubes. Crookes increased the vacuum and rearranged the entering electrodes, and thus sprung up the now familiar Crookes tubes. He ascertained by the employment of high vacua these remarkable facts :

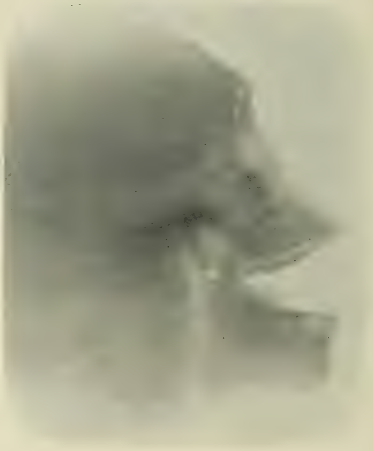
That in high vacua the molecules of matter, instead of being so close together that their mass was practically continuous, were so far apart and so few that they might be regarded individually. Such molecules actually seemed to have what Crookes termed a "mean free path." That is to say, they were able to be thrown across the vacuum tube from the poles with incredible velocity and great force, moving with but few or no collisions with each other and striking the sides of the glass to cause it to become heated and to exhibit vivid fluorescence. The effect of the projection of the molecules of air may be compared to a hail-storm, or to a bombardment by extraordinary fine shot. Crookes's radiant matter proceeded in straight lines, cast shadows of intervening objects, and could be deflected by magnets.

FIG. 1.



Ordinary photograph.

FIG. 2.



Skiagraph of same subject.

The work of Crookes has furnished the splendid inspiration for all that has followed in relation to the electric phenomena exhibited in high vacua. Some years later on Hertz restudied the Crookes tube effects, and Lenard, his pupil, discovered that the radiation from the tube was capable of exciting fluorescence outside of the tube, and of showing the presence of opaque objects in closed boxes upon a fluorescent screen. But such purely physical experiments attracted little attention outside of strictly scientific circles. It remained for Roentgen to make the sensational announcement that the bones of the living body might be photographed, so to speak, and at once the radiation from a Crookes tube became a wonder.

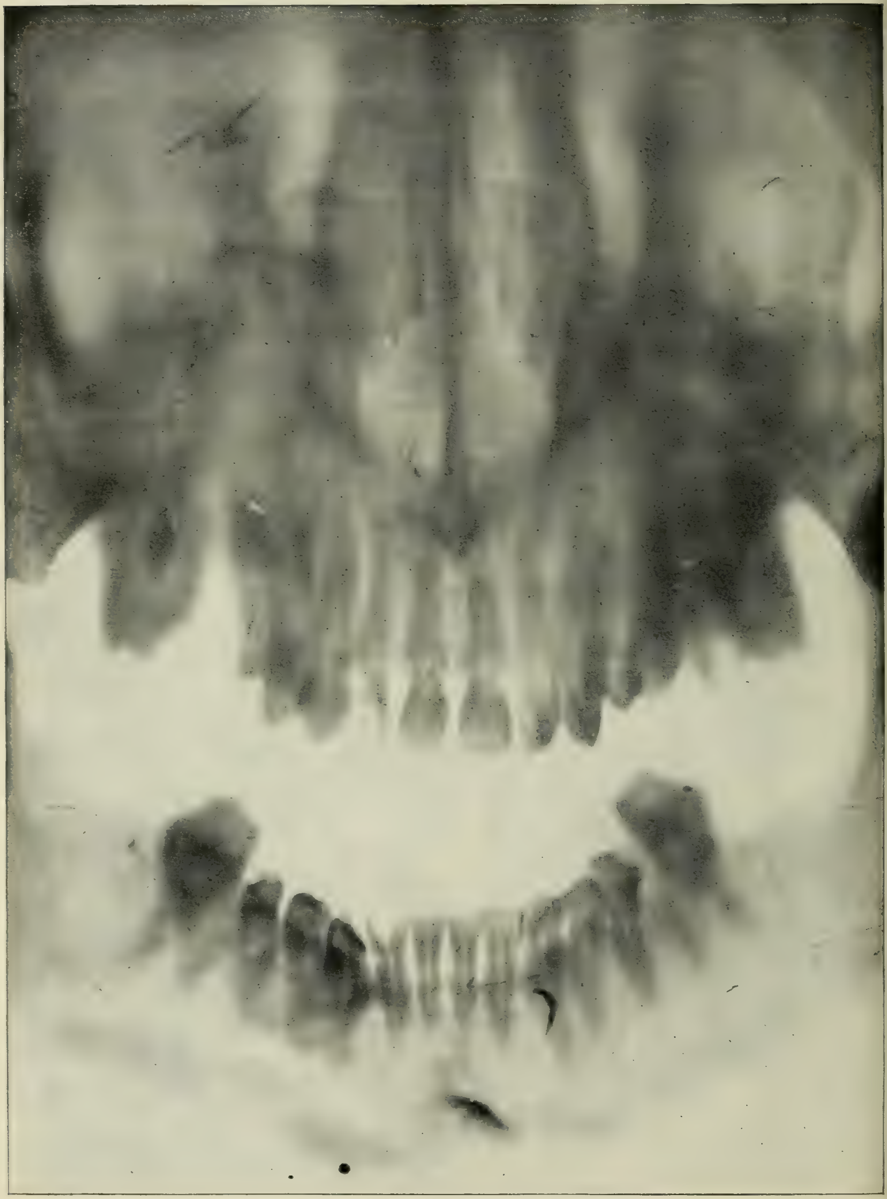
The scientific world is yet at a loss for a theory to account for the Crookes tube effects. Roentgen himself modestly termed it the "X, or unknown ray." Whether it is a ray at all is doubted. Opinions are divided largely into two camps, the one considering the X ray to be a vibration, transversal as in the case of light, or longitudinal as partly inclined to by Roentgen; the other adopting the Crookes, or English view, that it is a stream of electrified particles moving at a high rate of speed. It is on the whole doubted if the rays are light in any ordinary acceptation of the word. Edison and others think it to be of the nature of sound waves.

And thus the battle and conflict of opinion as to the nature of the X ray progresses. Man chafes under restrictions to his knowledge, and out of this mental restlessness come the great achievements of science and the final ameliorations of hardships and suffering to the entire race.

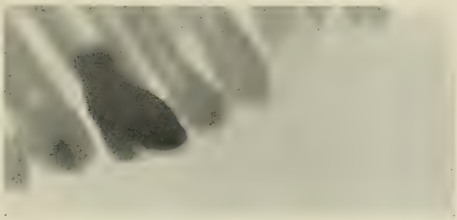
I will refer very briefly and concisely to the apparatus,—I will not say *necessary* to produce the X ray, but to the apparatus which I personally have found essential to produce it. A great diversity of opinion exists as to what you need. One man will talk of one form, and one of another. I am presenting to you to-night what I have found to be a good working combination. The X ray may be produced by the aid of an influence machine, and one might have been brought here to-night, where it is essential to use it; but it seems that we must produce our work with the induction coil. I was obliged to devise a tube of my own, which worked very well, because I had no Crookes tube. I put on the cathodic end a disk of aluminum, and on the anodic end also an aluminum disk. The anodic aluminum disk did not intercept the ray, and, more than that, it seemed to direct it and bring it down to a point. I produced some very good pictures of the hands and feet. I do not know but some time we may go backward and make use of this after all. The best form of apparatus is some form of the Ruhmkorff coil. As you use these vacuum tubes, their vacuum increases, that is to say, it becomes more and more difficult to induce the current to go by the pathway of the inside of the tube, and after a while the vacuum rises to a point where the current will jump through the air space rather than go through the tube. It is well to get a spark coil of about six-inch spark. This one has a length of about four and one-half inches.

As to the Crookes tube, it seems many of them can now be obtained. I have here some interesting ones made by Hicks, of London. These are of the recent type known as the focus tube. When we began and the fluorescence played like a stream of water against the tube, there was no definite picture, and everything was blurred. To a certain extent that was obviated by using diaphragms with apertures made in them; to another extent it was remedied by placing the Crookes tube at a greater distance from the object; but a greater distance from the object means a vastly increased exercise of power, and to-day we lack the power to do the work as it should be done. I have always believed that Mr. Tesla would be the one to exhibit the Crookes tube or some form of the X ray radiation with extraordinary power, such power as to extend to great distances, and so it has proven. He has produced effects with greater power than any one else in the world, probably. Mr. Swinton, of London, has also produced some very powerful effects; but even with such limited powers as amateurs like myself possess, we are able now to see through the human body with absolute ease.

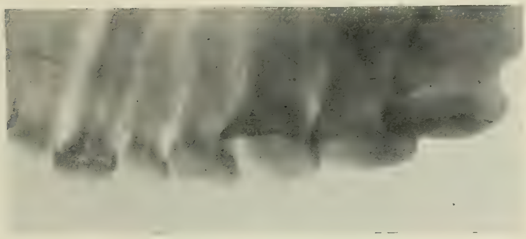
I believe these tubes are a step in the direction in which we must all work. They are called in this country "reflecting tubes." They



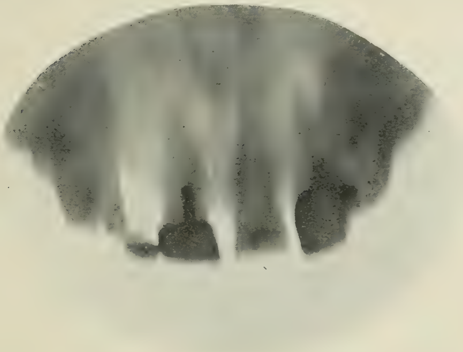
Skiagraph of Front of Skull, showing the Dentures, Pulp-Chambers of Incisors, etc.



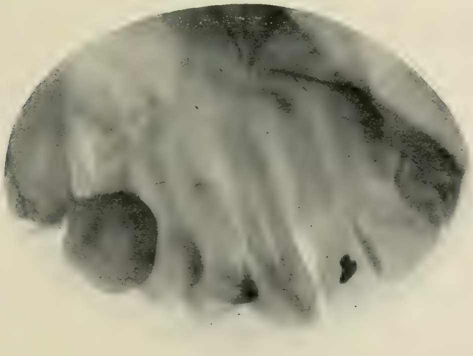
Artificial crown on molar.



Teeth *in situ*, pulp-canals, etc.



Artificial crown on left central, and bridge-work on right side.



Artificial crown on molar, lingual filling on lateral incisor.

SKIAGRAPHS OF PORTIONS OF SUPERIOR DENTURE.

have two electrodes, one the cathode, a concave mirror, and the other the anode, a flat disk of platinum. The cathodic stream is so arranged that it impinges upon the platinum and intercepts this stream, and the X ray is thrown off in every direction anterior to its plane. I call all these tubes "spatter tubes," simply because the effect is exactly as if you would turn a hose pipe with a strong stream of water against a wall. The water scatters in every direction, and some of it comes back. If you look with your fluoroscope behind this little piece of platinum, there is a dark area, showing that the radiation comes off from the plane surface.

I would advise any one who is going to buy the tubes to get the focus tubes. With them you get a most beautiful definition of your object.

When I use the term "fluoroscope" I presume every one is familiar with what is meant, still a word of explanation might be important. As I mentioned some time ago, it was long since observed that fluorescent substances outside of the Crookes tube were excited to activity by the radiation from the tube, but it was not then called the X ray. As soon as the X ray interest spread over the world people tried to find all the different forms of detection, and no one was more energetic than Mr. Edison. We all began with photography, which is only another form of detection of the X ray. It is supposed that the silver on the plate is excited into a state of activity in such a way as to set up the chemical action that is usually set up by light. The fluoroscope is only another detection of this ray. In order to bring it to a point where it could be used in the medical profession, because this X ray seems to be most useful to doctors, Mr. Edison stated the property of the different fluorescent substances. He announced that the tungstate of calcium was the most fluorescent substance he found. Some friends and associates of Mr. Edison at Menlo Park, Messrs. Ailsworth and Jackson, took up the practical manufacture of the screens, and to them we are indebted for the use of this large screen before you.

The crystals of calcium tungstate were at first coarse. As skill has progressed the crystals have been produced finer and finer, until here the surface is almost as smooth as enamel; and there is a purpose in getting it as smooth as possible.

In this connection I wish to read a special bulletin that Mr. Edison sent out from his laboratory when our representative visited him in the interests of our profession. He says,—

> I find by manipulating the coil, the break and the rate of break, that the form of the wave can be changed; crystals that fluoresce strongly with one kind of wave are weakened when the wave is changed, while other crystals increase, notably mercury diphenyl, which scarcely fluoresces with one form of wave, but comes out strongly when the wave is changed.

If you give any thought to the effects of the X ray on a photographic plate or a fluorescent screen, you will find that there is a great amount of truth in what Mr. Edison has stated in this brief communication. I often notice in working that I may get a beautiful effect on the fluoroscope and a very poor effect on the bromide of silver plate. Sometimes I think I get a very poor exposure, but when I develop the plate I find a very excellent development. Sometimes apparently the waves are longer and sometimes shorter. There is a particular ray adapted to certain substances which are to be excited by them or put into a state of fluorescence. In that connection the sensitive plate that one uses is of great importance. I have tried nearly all the plates, and am informed to-night by Professor Goodspeed, of the University of Pennsylvania, that Mr. Carbutt, of Wayne Junction, near Philadelphia, is making a plate that is very well adapted to this work. Every one wants to do this work well, to do it quickly, to get good definition and strong negatives. The question of speed largely depends on the plate you use. I have taken different objects and placed them upon a large plate, and, in my interest to see what the X ray was doing, have gotten under the table with the fluoroscope and looked through the plate and the object, and then developed that plate and found absolutely nothing upon it. The trouble I think was in the sensitive plate itself. I have found films to be very sensitive to the X ray. That was of particular interest to us, in regard to dental applications, because in taking many of these pictures in the mouth it is important to use the film. For making X ray pictures of living tissue containing teeth, the film is important. The way I devised was to cut a pattern in gutta-percha or cardboard, or anything that the patients could wear in the mouth without gagging too much ; if they gag too much I use the cocain spray. Having cut this pattern, I took it into the dark room and cut the film in the same shape and folded it into three folds of paper, and then ran it into a pocket of gutta-percha tissue and adjusted it to the roof of the mouth. The picture could be taken almost instantaneously. I say "almost" instantaneously, because that depends on the workings of your tube. Any area of the mouth could be depicted by the X ray in that simple manner. The use of the glass plate of course would present considerable difficulty.

Sometimes the vacuum of the Crookes tube is good, and sometimes bad. There are times when its force is wondrous, and thirty feet away you can detect the X ray ; and at other times you can get nothing out of it.

You will find that the lithographic prints in publications are very inferior to the photographic prints, and what is more pointed still, the photographic prints are vastly inferior to the negative. The real beauty of the X ray work is only to be found in the negative itself.

Applications in Dentistry.

And now, gentlemen, a few final words as to the applications of what we have seen.

The application of the X ray will, I believe, greatly aid the art of dental surgery. In general surgery it is difficult to over-estimate the importance of ascertaining the exact outlines of imbedded bones, of foreign bodies, to differentiate between a dislocation or a fracture, or to ascertain the co-existence of both. The X ray already makes these cardinal issues an open book ; it does more, it locates tuberculous deposits now known to frequently invade the osseous tissue and to be impossible of detection except by exploratory incisions; it locates also sarcoma and accompanying erosions of the bone within the narrow cavities, and it is more than possible that, thanks to the labors and the practical mind of Edison, these triumphs of localizing and diagnosticating records upon photographic plates will be supplanted, at least for quick and ready examinations, by the new art of X ray fluoroscopy. It was one thing to note that fluorescent substances outside of a tube were excited, it was quite another to find a working fluorescent substance and build it into a practical screen. This Edison did, and the efficacy of this screen and its revelations grow apace; its definition and degree of illumination increase week by week. Tesla already reports that he has seen through three men, that he has seen the great bones of the body, and seen the heart beat. Again and again I have looked through the human body and seen not only the vertebræ, the ribs, the hip-joint, but also located larger and denser organs like the liver; nay, more, I have watched the heart in its beatings. Who can guess to what lengths the visual exploration of our interior organization may reach when so much is already possible?

This enumeration, brief as it is, is a great triumph for the X ray, and these same questions of diagnosis and of localization are equally applicable to dental surgery.

The radiographs presented to you here to-night are but a first step toward taking pictures of the living teeth. They open out to your view a wondrous field for investigation and study and diagnosis. Each errant fang is distinctly placed, however deeply imbedded within its alveolar socket; teeth before their eruption stand forth in plain view; an unsuspected exostosis is revealed; a pocket of necrosis, of suppuration, or of tuberculosis is revealed in its exact outlines; the extent and area and location of metallic fillings are sharply delineated, whether above or below the alveolar line. Most interesting is the fact that the pulp-chamber is beautifully outlined, and that erosions and enlargements may be readily detected. A new method of studying pathology in the living subject is laid before you.

To what perfection, gentlemen, may not the science and art of dentistry reach if some of the new things which press upon your attention are fully realized. Already painless dentistry is within your grasp by aid of electricity and simple anesthetics, and now the X ray more than rivals your exploring mirror, your probe, your most delicate sense of touch, and your keenest powers of hypothetical diagnosis.

Strange to say, both advances are poured forth to you from the fertile lap of electricity. It behooves you to be up and doing in this matter; and if the seed here sown to-night shall bear fruit, I shall be more than glad that it has been my good fortune to have called to your attention the new and wondrous field of investigation opened out to your view by the discovery of the X ray.

THE ORAL EXPRESSIONS OF MALNUTRITION.

BY M. L. RHEIN, M.D., D.D.S., NEW YORK, N. Y.

(Read before the New York Odontological Society, March 17, 1896.)

DEFECTIVE nutrition resulting from imperfect assimilation of food and faulty metabolism is generally termed "malnutrition." Without going into a résumé of the physiological functions of the alimentary tract, it might be well to call your attention to the indispensable rôle which the mouth plays in the act of digestion. The importance of thorough mastication and consequent insalivation of food as the first act of the chemical transformation of such food into protoplasm is certainly well understood in our specialty. It is very significant that the earliest manifestations resulting from malnutrition are noticed about the pericemental tissues. The careful observations of some of our most distinguished specialists have established this fact beyond dispute.

We look in vain through the general medical literature on this subject to find any reference to this fact, and the important bearing which it has both in the diagnosis and the treatment of disease. It therefore becomes one of those trophies of dentistry that we have achieved in this age of research, that we have been the first to call the attention of the general medical practitioner to the urgent necessity of taking this important observation into consideration,—important in two respects:

First. Its value in aiding in the early diagnosis of disease; and

Second. The necessity of placing the oral cavity in a condition as nearly akin to health and usefulness as is possible, in order that the first act of digestion should be efficiently performed.

Besides the pericemental tissues, the other portions of the body which first show manifestations of malnutrition are the skin, the nails, the cornea of the eye, etc.; in fact, those portions of the human economy which are fed by the ultimate terminals of the circulatory system.

In this respect I repeat with the assurance of more recent observations what I stated in "Studies of Pyorrhea Alveolaris," published in the DENTAL COSMOS of March, 1888: "The gums and peridental membrane being fed by about the most remote portion of the blood-tracts, it is no more than reasonable to suppose that these organs should be the first to exhibit symptoms of a lack of nourishment in their elemental corpuscles."

Malnutrition does not necessarily imply a state of anemia, although this is often accepted as the meaning of the term; for hypernutrition is as productive of faulty metabolism, if not more so, than the lack of sufficient nourishment.

It being impossible to cover the entire field of this subject, I shall deal mainly with such forms of malnutrition as are associated with the retention or the excessive production of uric acid in the blood.

This subject has been brought to our attention in recent papers by Peirce, Talbot, Kirk, Darby, and others, on the uric-acid diathesis and kindred topics.

The true solution of the uric acid problem is being slowly worked out by the painstaking researches of scientific investigators. While we cannot give positive assent, at the present day, to the results of the investigations of Roberts, Hirschfeld, Ebstein, Horbaczewski, and Levison, yet the concensus of their researches has demolished so many of the old views that until their results have been proven to be erroneous, we must accept their views, hypothetically at least.

Levison, in his recent work on this subject, draws from the latest investigations the following conclusions:

"First. Uric acid is formed in the body by the disintegration of the albuminous substances of its tissues, especially of the nuclein or nucleins.

"Second. The excretion of uric acid becomes increased or diminished by all factors (diseases, medicines, poisons, etc.) which give rise to a more rapid or slower disintegration of the cellular elements of the body, and especially of the leucocytes.

"Third. The taking of food, especially flesh food, causes a temporary leucocytosis (digestive). This leucocytosis probably arises from the nuclein of the food.

"Fourth. The amount of uric acid excreted in twenty-four hours is not influenced to a great extent by food. There is, however, this distinction noticeable: the easily digestible animal albumens set up digestive leucocytosis and formation of uric acid much quicker than the vegetable albumens, which are difficult to digest."

If Horbaczewski's investigations are of any value, they certainly show that uric acid excess is a concomitant, not only of gout, but of various diseases, poisons, drugs, and nervous shocks. They have demonstrated further the falsity of Haig's views in reference to the constant proportion of uric acid to urea, which he gives as about 1 to 33. Horbaczewski has shown by a series of beautiful experiments that the proportions of urea and uric acid are absolutely independent of each other. If we are to give entire adherence to his views, we must accept as a fact that there is a constant proportion in the number of leucocytes or white blood-corpuscles formed, and the amount of uric acid secreted.

This result has been corroborated by the experiments of Hirschfeld, Bohland and Schurz, Stadthagen and others, and also by the noteworthy fact that the production of uric acid is increased in a whole series of diseases characterized by the formation and destruction of a large number of leucocytes.

Maress also disproved the idea of there being any constant relation of the secretion of uric acid to urea, by showing that after a heavy meal the uric acid increases very rapidly, while urea does not begin to increase until later. From this he concludes that urea is a product of the albuminous substances introduced as food, while uric acid is formed from changes in the tissues themselves.

Levison has shown that the increase in the amount of albuminous substance consumed increases in a similar ratio to the amount of urea secreted; while the increase in uric acid bore no relation to the amount of such albuminous substance. These facts must tend to the abolition of the old theory that in health, uric acid is oxidized in the blood into some more soluble substance, and that in other conditions this oxidation is not performed, or, if so, in an imperfect manner.

In a similar way it disposes of the theory so ably presented a few months ago before this society by Dr. Burchard, wherein he says, "A substance—urea—that should be excreted by the kidneys, is replaced by a substance which is not perfectly excreted by the kidneys." I do not wish to intimate that Dr. Burchard still holds these views, for in the same discussion he manifests his familiarity with the latest researches on this subject.

It is impossible, in the time at my disposal, to illustrate fully to you the varying and enormous amount of recent investigations on this subject, which, in fact, is being added to more continuously than any other topic in pathology.

We are reasonably safe, however, in asserting that the uric-acid dyscrasia is due to an excessive amount of uric acid in the blood (or to be more clear, according to Roberts, the quadriurate).

Levison gives two rational explanations for this: "It (uric acid) must either be formed so abundantly that some is stored up in the blood, although the normal quantity is still excreted; or the production of uric acid being normal, or even diminished, an abnormal quantity is retained in the blood. In other words, the disease must be caused by a functional irregularity of the kidneys."

Either or both of these conditions can be present. When the kidneys are so affected by disease that they cannot perform their normal function of more or less thoroughly excreting the uric acid, there results what is known as gout and its kindred affections.

The fact of uric acid being retained in the system on account of the inability of the unhealthy kidneys to excrete the same, has no relevancy to the amount of uric acid produced in the blood. This condition will be found where there is a diminished production, as well as an overproduction of the uric acid in the blood. On the other hand, all the baneful effects arising from overproduction of uric acid may be present, but as long as the kidneys are able to perform their normal functions no gouty symptoms are liable to supervene.

Levison cites numerous writers, such as Bartels, Camerer, Laache, Bohland and Schurz, Stadthagen, and others, to corroborate his statement that leucemia may be named as a typical example of a disease accompanied by a constant excessive production of uric acid without usually being associated with gout.

Great importance is attached to this point in our field of work, in order to dispel the illusion that in persons affected with pyorrhea alveolaris, or erosion, where the trouble appears to be due to an increased amount of uric acid in the blood, it necessarily follows that the patient has gout. He may just as likely be suffering from tuberculosis, pneumonia, Bright's disease, neurasthenia, or perchance be under the toxic effect of some powerful drug.

In accordance with the results demonstrated by these investigators, and from clinical observation of various cases of pyorrhea complex, both in private and hospital observation, I advocated at the meeting of the American Dental Association, at Old Point Comfort, in August, 1894, an etiological classification of pyorrhea alveolaris, by prefixing an adjective stating the name of the disease which is causing the pathological symptoms in the oral cavity, as "rheumatic pyorrhea," "lead pyorrhea," etc.*

There seems to be little question but that excessive quantities of uric acid in the blood are concomitant with an imperfect supply of protoplasmic corpuscles, though it has not been settled whether impaired nutrition is always accompanied with this increased amount of uric acid in the blood.

Another point that has been clearly demonstrated by these late researches on the baneful effects of retained uric acid, in contradistinction to increased production of uric acid, is the small value to be placed upon the urinal examination of such cases. The results are bound to be negative as long as the kidneys are improperly performing their functions. In such cases, in order to obtain a positively accurate knowledge of the condition of affairs, it is necessary to make a proper test of the blood to discover the relative proportion of uric acid there present. This is a very difficult matter, as it requires a larger amount of blood than it is generally possible to obtain for such a purpose.

---

* Professor W. D. Miller, in his text-book on conservative dentistry just published in Berlin, gives practical assent to this classification by giving a long list of nutritional disturbances as the predisposing causes of pyorrhea.

These same authorities have shown that whatever tends to lessen the alkalinity of the blood, favors the deposition of the uric acid, in the form of urates. In all such cases there is a consequent hyperacidity of the system, which is possibly the primary cause of erosion, as has been so ably expounded years ago by Kirk and Darby. Whether we agree or not with the very plausible theory of Ebstein that before the deposit of uric acid in the shape of urates, a necrosis of the tissue with an acid reaction has set in, we are familiar with the fact that in pyorrhea alveolaris there is a scarcity of the elemental corpuscles in the terminal capillaries, and a strong tendency toward a stagnation of these vascular currents.

Following along the line of Ebstein's theory, we can readily believe that on account of this deficiency of elemental corpuscles in the pericemental tissues, a necrotic area is set up; a hyperacidity of the system being present at the same time, it follows that there is a strong tendency for the uric acid in the circulation to be deposited in this acid necrotic area.

This view is certainly in accord with the results of recent investigations, and it can also be said that treatment carried out on the basis of this reasoning has been very successful in its results. We can likewise suppose that in those cases of erosion unaccompanied by any pyorrheal condition, the ultimate capillaries continue to obtain a sufficient supply of elemental corpuscles to nourish the pericemental tissues and prevent any retrogressive metamorphosis, which is always the commencement of necrosis.

Whether these theories of the beginning of pyorrhea complex or of erosion will continue to be held precisely on these lines is not of so much practical importance to the dentist, as is the knowledge that this condition of affairs is merely a symptom of functional disturbance It is consequently of primary importance that the real disease should be carefully diagnosticated before the treatment of the oral symptoms can progress on any rational lines. In this respect the medical adviser should co-operate with the dentist. The fact of discovering a retention or over-production of uric acid in the blood should be merely the commencement of a differential diagnosis, as it is not sufficient to prescribe a uric acid diluent, in order to aid in its excretion and render its passage through the kidneys more easy, although this treatment is generally of marked benefit to the patient.

It is, however, of the utmost importance to discover, if possible, whether the kidneys themselves are in a condition of health, or whether some functional disease of these organs exists. If the kidneys are found to be healthy, so that their ability to excrete uric acid is unimpaired, the question of there being present any phase of gout or kindred diseases is at once set aside.

A large class of cases of pyorrhea alveolaris present themselves to us, where on account of the excessive brain activity there is bound to result a similar excessive disintegration of the nucleins, and a consequent overproduction of uric acid. When we get, as we commonly do in these cases, a dearth of elemental corpuscles, a condition of pyorrhea complex results, accompanied by deposits of the urates, because, although the kidneys are able, and do excrete quantities of uric acid, the overproduction of the uric acid becomes so great that the urates are very easily deposited in any favoring locality. These are the cases in which, upon urinal examinations being made, an excessive amount of uric acid is generally found. These represent also the cases which are very much improved by rest, travel, and change from the ordinary wearing occupations of life.

If, however, the kidneys are unable to perform their natural functions in excreting uric acid, a much more serious condition of affairs is presented to us. It is possible, where the disease has not progressed too far, to bring about an improved functional condition of these organs so that they will again excrete uric acid.

As in such cases urinal examinations before treatment will show no uric acid to any extent, and as up to the present time the blood examinations are very impracticable, it often becomes necessary to try the effect of remedies which will aid not only in tending to dilute the urine, but which will assist the kidneys in excreting the uric acid. Frequently the results of urinal examinations after treatment of this kind has been in progress for some time, will show so large an increase in uric acid that there is left very little doubt that the patient was suffering from a retention of uric acid.

TREATMENT.

In treating the various forms of pyorrhea complex accompanied with overproduction or retention of uric acid, we should use every means at our disposal to discover the manner in which our patients live, in order to determine what existing factors favor an overproduction of uric acid. Advice tending to diminish the disintegration of tissue, and consequently the overproduction of uric acid, given to the patient in the proper manner, is of more real benefit than drugs or local treatment. It is unnecessary to dilate upon the necessity of less mental strain, and the refraining from over-indulgence in toxic drugs.

In this respect great benefit is often obtained by attention being given to general hygiene. While moderate exercise is beneficial, an excessive amount of it tends strongly to overproduction of uric acid, and should be carefully avoided.

In order to diminish the possibility of kidney-diseases, the skin should be stimulated and hardened against changes of temperature. For this purpose, warm baths, followed by cold douches or sponging, with sufficient friction or massage, are very advisable.

All the old views on the question of diet in the uric-acid dyscrasia are set aside by these recent investigations. A reasonably mixed diet is much more to be commended than one in which there is a possibility of the tissues suffering from the lack of some required sustenance. Overfeeding is very detrimental, as it is largely productive of uric acid. On the other hand, it has been demonstrated that the acidity of the system is very much increased by fasting, consequently the advisability of not allowing too long an interval to elapse between meals. The old-fashioned idea of taking no food between eight o'clock in the evening and the following morning's breakfast is remarkably productive of hyperacidity during the night, and may account to some extent for the increased ravages of erosion during the hours of sleep. No more fitting time for the introduction of some food into the stomach can be found than immediately preceding rest. Hence the advisability of a light meal before retiring.

It is unnecessary to mention the ill effect of such drugs as alcohol in the excessive production of uric acid, and the over-indulgence by the patient in any favored article of food which has a tendency in this direction.

Where mental over-exertion is the cause, too great stress cannot be placed upon the benefit resulting from sound sleep, which must be obtained at all hazards.

Outside of these general directions for the manner of living, the remainder of the treatment of such cases, from a constitutional standpoint, should be left to the medical adviser, though mention might be made of the valuable results frequently obtained from the proper use of sedatives.

It is not my purport to enter into any detailed description of local treatment. Each case must be carefully considered, and treated in accordance with the conditions and symptoms presented, and cannot be used as a proper indication for the treatment of a subsequent case.

It might be well to lay down a few general principles for the local treatment of pyorrhea alveolaris :

Make a careful diagnosis of the condition of the pulp of each tooth in the infected territory.

In case of the death of any pulp or the approach to such devitalization, the first step is the cleansing, sterilizing, and proper sealing of the root-canals.

The next step is the thorough removal of all deposits from every portion of the roots ; and it is not my intention to discuss the details of this most important phase of local treatment, nor the various forms of medication required to remove the necrotic zone of tissue and produce new and healthy granulation.

Loosened teeth must be held in a firm position, in order to obtain beneficial results.

Missing teeth must be replaced by artificial substitutes, introduced so as to produce the least possible irritation upon the soft tissues.

It is of great importance that the occlusion of all the teeth should be as nearly correct as possible.

And lastly, the most thorough directions should be given to the patient in regard to the local hygienic care of the teeth and the mouth generally. This should not only apply to the keeping of the teeth and gums free from the inroads of micro-organisms, but attention must also be given to keeping the tongue and the pharynx in the same sanitary state.

With this object in view, frequent use of sterilizing sprays cannot be too strongly advocated, and in cases of fissures of the tongue, the patient should be instructed to use a tongue-brush moistened in a suitable sterilizing fluid.

The practical object of this paper is to emphasize the fact that the uric-acid dyscrasia can be associated with almost any disease accompanied by malnutrition; and in order to show the wide range of pathological conditions which are liable to produce pyorrhea alveolaris, I append some excerpts from my case-book. Before detailing some notes from these selected cases, it might be well to say that careful clinical observation has demonstrated to me the fact that according to the character of the primal cause, the appearance of the inflamed gums and the character of the deposits and exudations will vary greatly, as well as the symptoms expressed by the patient. My observations on these variations are not so thorough that I can at present classify them according to their individual diseases, but I wish to have recorded the statement that the physical condition of the peridental tissues can become a great aid in differential diagnosis.

Case No. I.—*Gouty Pyorrhea.* The cases of true gout that present themselves to us bear a very small proportion to the number of diseases which furnish us with typical cases of pyorrhea alveolaris.

Mr. F., aged about fifty-five. He has been under treatment for pyorrhea for about eight years, having been treated before he came to me by another dentist. The family history shows a marked gouty diathesis, and the condition of the kidneys and joints leaves no question of this being a case of true gout. While the patient is simply of ordinary physique, being not over five feet seven inches in height, the teeth are very large and massive, with such a fine enamel-structure that there has never been any caries during the time he has been under my observation. The only fillings in his mouth are in the occlusal surfaces of the first inferior molars. Before coming under my care he lost the four second molars as a result of this disease. The teeth generally protrude,—a typical symptom in gouty cases. It is necessary to remove the deposits from these teeth two or three times a year. This is difficult,—so much so that only three or four teeth can be operated upon at one sitting, and the effect of this deposit for years has been to expose a considerable portion of the roots. This is most marked in the posterior teeth. Notwithstanding this, none of them are loose. In the molars the deposits extend up between the roots, and cause an exuberant growth of giant-cell tissue to wind itself about the roots, which it is absolutely necessary to destroy during treatment. There is more or less serous exudation, dependent upon the neglect of directions as to antiseptic spraying by the patient. The missing teeth have been replaced with what is known as the "Bonwill Clasp Plate." While it is impossible to effect a cure in such a case as this, nevertheless the constant attention given to the frequent and careful removal of all the deposits will unquestionably tend to lengthen the period of the usefulness of these teeth. Without that attention, many of them would have been lost long ago.

This case is typical of its kind, where for a period the patient will pay a great deal of attention to diet, hygiene, and constitutional aids for eliminating uric acid. During this period the teeth will remain in a comparatively good condition The patient will then relapse from this care, and after such relapse, which frequently consists in nothing more than a moderate indulgence in alcoholic beverages, a marked retrogression will ensue.

Case No. II.—This represents a type of cases which appear to be afflicted with a combination of rheumatic and gouty symptoms. It is at present one of the most difficult questions in pathology to decide just under what category cases of this nature should be placed.

Mr. R., aged about thirty; resident of Germany; dealer in hops, which necessitates (from a business standpoint) his indulgence to a considerable extent in malt liquors; has suffered for the past four years from intense neuralgic pains throughout the body, but more marked about the mouth; during the past year has suffered very much from insomnia. The serumal deposits around his teeth are of an extensive nature, but not difficult to remove. Although he has paid considerable attention to the care of his teeth, these deposits have caused the loss of the four inferior incisors, the second inferior left molar, the first and second inferior right molars, and the superor left second molar. Upon the advice of a prominent German physician, who assured him that he had no gout, Mr. R. took a trip to this country about two months ago. During the voyage a lurch of the steamer threw him violently against the edge of his berth, and caused an ugly wound of the soft tissues and a slight fracture of the incisive process of the superior maxilla. He came to me immediately after his arrival in New York, and I found him in a very nervous condition, suffering much pain from the wound, and especially complaining of the fact that he had not slept since the accident, which had taken place about six days before I saw him. The right superior central was somewhat elongated and very painful to the touch. As it did not respond to the cold test, the pulp-chamber was at once opened, and the pulp found to be entirely devoid of life, but no putrescence had set in. The pulp was carefully removed, and the canal sealed in the usual manner. Although the symptoms of local pain about the incisor had subsided, and the soft tissues healed over, the patient still complained of his inability to sleep, and of intense pain throughout the entire maxillæ, especially at night. The oral fluids invariably showed a decided acid reaction, and there was at this time a temperature of about 101° F. A urinal examination showed nothing abnormal, beyond a trace of albumen. Local treatment for the removal and treatment of the sockets of the individual teeth was at once commenced, and special directions given to the patient in regard to general hygiene. He was instructed to take a hot bath every morning, followed by a cold douche, and this in turn was to be followed by vigorous friction. He was given forty grains of tartarlithine in hot water daily. Ten days after, a urinal examination showed a large increase in the amount of uric acid, together with large phosphatic deposits. The albumen had entirely disappeared; the patient still complained of insomnia, but with a diminished amount of neuralgic pain. He was then given ten grains of bromide of strontium every night before retiring. This slight sedative at once dispelled the insomnia, of which he has not complained since. The administration of this sedative was continued about ten days, and since then there has been no recurrence of the insomnia, and the patient expresses himself as having absolutely no pain in the mouth. He is now traveling through the country, and on his return artificial teeth will be placed in his mouth in such a way as to avoid the irritation to the adjoining teeth which is now produced by the plate which he is wearing.

CASE No. III.—*Lithic Pyorrhea.* Mr. G., aged about forty; unmarried; came under my observation in September, 1895; no occupation, except being a member of almost every prominent club in New York city; tall, robust, weight about two hundred pounds; hereditary history of lithemia; inclined very much to over-indulgence both in food and alcoholic beverages. His only exercise appears to be riding in a cab and sailing on a yacht; has lost no teeth, although he was suffering from caries in many of them. The teeth were coated with serumal deposits of great density, and very difficult of removal. The gums were hypertrophied and very much inflamed; upon pressure, pus would exude from the gingival border of any of the teeth. A urinal examination showed a very high specific gravity, acid in reaction, dark brown color, large amount of uric acid, and, upon standing, there was shown a considerable deposit of gravel. After a short interval of treatment, which caused the most marked symptoms of improvement, the patient returned to his old habits of over-indulgence, which naturally brought about a relapse in the mouth. I have not seen him in three months.

CASE No. IV.—*Diabetic Pyorrhea.* Mr. B., aged about fifty-five, presented himself in October, 1891. This case is described in an article on "Ideal Bridge-work," printed in the DENTAL COSMOS for February, 1894. The patient suffered from the loss of numerous teeth, and on account of the nervous symptoms he was unable to wear any plate. The manner of replacing the missing teeth is there detailed. His general condition since the report then made has kept up to the improved standard, so that he has retained his teeth in the same degree of usefulness as they were in at that time. The case is especially noteworthy as showing the marked benefit produced upon the general health of the patient by supplying him with a comfortable means for thoroughly preparing his food for digestion.

Case No. V.—*Glycosuria* (*pyorrhea*). Mrs. K., aged between fifty-five and sixty. The history of this patient for a number of years has demonstrated the fact that she was suffering greatly from the uric-acid dyscrasia. Uric acid in excess is frequently found in her urine, and at other periods there is a marked appearance of sugar. She has lost all of the inferior molars except the third molar on the left side. The deposits are not extensive, but there is a marked acid condition, with so much retrogression of the soft tissues that the inferior incisors are all very loose. When she first came under my care, pressure upon the gums over any tooth would cause considerable serous exudation. The patient has always been under very efficient general treatment, and the local treatment was carried out on the lines above designated, with the addition of supplying the missing lower teeth on a gold plate with a clasp about the left molar and the right bicuspid. Passing across the lingual surface of the front teeth is a heavy piece of clasp metal, not wider than a quarter of an inch, and not impinging upon the soft tissues. From this plate of clasp metal there extend three very thin pieces of clasp metal between the incisors, which have T's so arranged on the labial surface as to hold the loose front teeth firm when the plate is in position. The point to which I especially desire to call your attention in this case is that the patient is very frequently subject to constitutional relapses, when there will appear either excess of uric acid or some sugar in the urine. Invariably under such circumstances, and notwithstanding the most careful local atomization, the mouth will show an apparent hygienic neglect. Medical attention to her general condition at once produces a most decided change in the oral symptoms. This has been noticed a number of times within the past three years.

Case No. VI.—*Bright's Disease* (*pyorrhea*). A year ago last fall I was called into consultation by Dr. R. Ottolengui, to see a patient who had suddenly developed a most acute attack of pyorrhea alveolaris, and who had always given the greatest attention to the ordinary care of her mouth. I was at once attracted by the clinical fact that within a short distance from the gingival border of the gum there was a narrow, serpentine line of marked inflammation. This peculiar appearance I have so often observed in Bright's disease that I at once ventured to make a guess diagnosis of the case from this one fact. The patient gave no history of any medical attention for years; but subsequently, upon a careful examination, incipient Bright's disease was diagnosed. Dr. Ottolengui has kindly furnished me with the following report of the case:

"Mrs. M., aged forty-eight; pyorrhea pockets, notably in the superior incisor region; right superior lateral having growth of hypertrophied tissue reaching half-way to cutting-edge and protruding from the pocket, but not attached to the free margin of the gum; other incisors and the cuspids above similarly affected, but not so badly. Left superior first molar, pocket extending to apex of anterior buccal root, and free discharge of pus; pulp alive, but not responsive to treatment. Applied arsenic to destroy pulp, and then found canal of anterior buccal root so attenuated that cleansing was impossible. Tooth became decidedly worse, and extracted it. Four front teeth and second left inferior molar also affected, the latter having the deepest pocket and hypertrophied growths. First urinal examination evidenced Bright's disease, but of uric acid only slight showing. Treatment locally, thorough cleansing of pockets one or two at a time, packed with absorbent cotton, left in place twenty-four hours, then deposits removed with engine bur. Dressings of trichloracetic acid until hypertrophied condition had yielded, after which mild astringents and pepsin paste, three per cent. pyrozone used as a mouth-wash and spray by patient three times daily.

"Physician's treatment, baths, regimen, and diet. Local improvement as long as patient was seen three times a week After one month dismissed patient for one week, and when she returned retrogression was very marked; hypertrophied tissue appearing in sufficient quantity to prove that local treatment would not avail without constitutional attention.

"Insisted upon tartarlithine, and exclusive use of lithia waters. Three weeks later, urinal examination showed that uric acid was being freely eliminated, and local condition much improved.

"Saw this patient twenty times between March 9 and June 3, when she went to the country. Against my advice, went to seashore, and I saw her twice during June, slight retrogression showing. Finally, on July 1, my advice to try Catskills and high altitude was adopted, patient remaining until November. Returned in vastly improved health; gums healthy, teeth firm, in which condition they are at present, no further treatment having been needed."

CASE NO. VII.—*Tubercular Pyorrhea.* Dr. F., aged about thirty-three; throat specialist, of Albany. His teeth had been under my care for twelve years, and were always in very good condition, with a minimum amount of deposit, requiring removal not over four or five times during that period. He took the very best hygienic care of his mouth. In the spring of 1891 he suffered from a severe attack of "la grippe," and in the enfeebled condition resulting therefrom, he must have become infected with tuberculosis. An examination of his mouth in October of that year showed a most distressing condition of affairs, notwithstanding the fact that he was giving the most careful attention to local treatment of the oral cavity. The teeth had all become loosened, there were extensive hard deposits about the roots, and a continuous purulent exudation from the gingival border, from which at the time I drew a very bad prognosis. He spent a few months in Colorado, returning in January, 1892, to Albany, where he died a few days afterward, from miliary tuberculosis.

CASE NO. VIII.—*Typhoidal Pyorrhea.* Mr. E., aged about twenty-one; a student of the School of Mines of Columbia College. His mouth had been under my observation for many years, and was always in an excellent hygienic condition. I was called to see him during his convalescence from an attack of typhoid fever. He was suffering considerably about the peridental tissues from the irritating effects of almost all forms of food which passed through his mouth. I found the mucous membrane very much inflamed, with considerable exudation from the gingival border. The use of the three per cent. pyrozone spray brought speedy relief in this case.

CASE NO. IX.—*Pyorrhea of Pregnancy.* Mrs. W., aged about thirty; mother of one boy about four years old. She came to me in the spring of 1893, with her mouth in a very bad condition from the effects of pyorrhea alveolaris. At that time there was a distinct evidence of anemic conditions. Her child was then about one year old, and the condition was very likely due to the too long-continued nursing of the child. Careful attention to diet, tonics, and local treatment, soon produced a healthy condition of the oral tissues. The patient visited me in January, 1896. She was then pregnant about five months. Although she has always been remarkably painstaking in the care of her mouth, there was noticed considerable inflammation about the gingival border of most of the teeth. This was especially marked about the inferior incisors and lower molars. A diagnosis of insufficient nutrition was made. She was told to eat bread made of the whole wheat, and take the compound syrup of hypophosphites of lime. No local treatment was given, except the daily attention of the patient to the cleanliness of her mouth. Within two weeks all signs of this inflammatory condition had disappeared.

CASE NO. X.—*Anemic Pyorrhea.* Mrs. H., aged about thirty-five; consulted me in the fall of 1895 with reference to the possibility of preserving her natural teeth. She was a resident of a small city in Pennsylvania, and being dissatisfied with the treatment she could receive there, she spent the winter in New York in order to have done what was possible for improving her oral condition. In the superior maxilla there were missing the first molars and the second bicuspids, and in the inferior maxilla the first and second molars. Pressure upon the soft tissues would produce excessive exudations of pus at almost any point. The gum was pale and flabby, and a similar appearance of the mucous membrane was so marked that the lips had almost a yellowish appearance. The inferior incisors were exceedingly loose, and the right lateral had moved from the central a distance of about three-sixteenths of an inch. The first right inferior bicuspid had also become very loose and moved toward the cheek, so that it had lost its occlusion with its superior antagonist. The superior left central, lateral, cuspid, and bicuspid had all moved out of position, and were very much loosened. The second superior left molar had a large anterior approximal filling of amalgam. It was extremely loose, and the pus exuding from the margin of the gum was so much more exuberant than at any other point that the possibility of a complication of alveolar abscess was feared.

Upon opening the pulp-chamber, this was found to be the condition of affairs. A similar state existed in the left inferior third molar. The hyperacidity of the mouth was so great that the approximal surfaces of all the anterior superior teeth near the gum were entirely denuded of enamel, and so excessively sensitive to the touch that it interfered very much with the proper treatment of the individual teeth. There was extensive serumal deposit upon the roots of all the teeth. The general history of the patient showed that some two or three years previous she had suffered from a severe nervous shock, and since that time her physical condition had been very much neglected. She had almost entirely abandoned eating meat, and was what might be termed a vegetarian. A urinal examination showed intense acidity, some traces of albumen, and an excessive amount of uric acid. The patient was placed upon a strongly nutritious diet, mainly consisting of meat, milk, and eggs, together with a slight amount of alcohol daily, and in addition to this the extract of malt with iron, and the daily administration of twenty grains of tartarlithine diluted in much water. The local treatment was very laborious, and was only concluded with reference to the inferior teeth, just before she departed for home after a two months' sojourn in New York.

She was then wearing a fixture in the lower jaw, supplying the missing teeth, restoring the first bicuspid to its natural condition of usefulness, and holding the anterior teeth in a firm position, in a manner similar to the case described in Case No. V. Her condition at this time was so improved that she had gained ten pounds in weight, and the natural color had returned to her lips. Pressure upon the gums at any point failed to produce any exudation. She is at present back in New York, in order to have the rest of her mouth placed in such condition that the usefulness of her teeth may be preserved. It is impossible, with the time at my disposal, to enter into the interesting details of the entire treatment of this case. Her mouth has remained in a hygienic state, and there is but little doubt that the supplying of the needed superior artificial teeth in such a way that no tooth will be without proper lateral support, will very much further improve her condition.

In this manner I could follow up cases of record, such as neurasthenic pyorrhea, syphilitic pyorrhea, mercurial pyorrhea, etc., but time not only forbids, but renders it absolutely impossible to give a clear idea of the details in even these cases already mentioned.

The history of all these cases shows their undisputed origin to be from nutritional disturbance. Many of them have been a great aid in the proper diagnosis of such disturbances; and what is of the most importance is the fact that the attention to the improvement of the local symptoms, and restoring the proper function of mastication, has tended very materially toward improving the general health of the patient.

SIEGFRIED'S REGULATING SPRING.

BY R. RUNSCHENBACH, ZAHNARZT, DRESDEN, GERMANY.

MANY very complicated pieces of mechanism have, from time to time, been devised to correct dental irregularities, and used with varying success ; surely this multiplicity of apparatus is an evidence that they all have deficiencies which hinder their general application in regulating practice.

We wish to call attention to a new and very simple appliance which has been in use for a number of years, and the result in every case where this method has been tried has been most satisfactory.

Siegfried's regulating spring is well known. Any practitioner can use it with facility and without putting the patient to special inconvenience, for which reason we commend Siegfried's new method of affixing his regulating spring to the consideration of the profession.

The following illustrations afford examples of the new method of moving teeth for regulating purposes, and no one who has made a careful study of regulating can fail to see the advantage of the extreme simplicity in all appliances here figured.

FIG. 1.

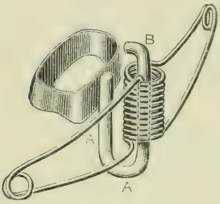
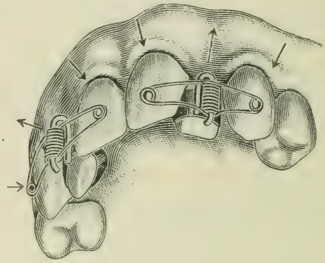


FIG. 2.



To Draw Receding Teeth into Position.—A nicely made band is fitted to the irregular tooth. This done, a piece of wire is cut and soldered to the band, with the end of it bent up so as to form a hook, see Fig. 1, *a*. The prepared band is now firmly cemented to the tooth. After this, separate the two wings of the spring, slip the spiral on the hook *b*, and finally the end of it is bent over, so the spring is prevented from slipping off. The action of the spiral and of the wings is shown by the arrows in Fig. 2.

FIG. 3.

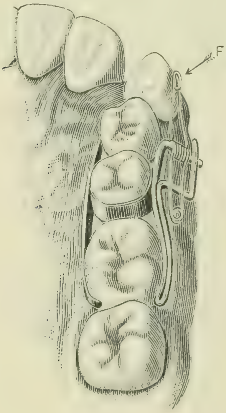
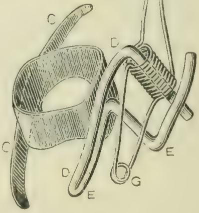


FIG. 4.



Retraction of a Tooth.—As will be seen on referring to Fig. 3, this is a case where a forward growing cuspid is to be pressed backward. Here we have as a driving force only one wing of the spring. See Fig. 3 and Fig. 4, *f*.

The band is fitted to the second bicuspid, and as shown in Fig. 4, *c c*, a piece of half-round wire is soldered to the band on the lingual surface, starting from the first molar and ending at the first bicuspid. By this arrangement the spring is supported by three teeth. On the labial surface two wires, bent at right angles, are soldered, Fig. 4, *d e*.

Thus prepared, the apparatus is cemented to the second bicuspid. The spring is then placed on the bent end of the wire *d*, and the end of the wire *e* is bent over again to firmly hold the spring. The wing *f* of the spring exerts its power against the cuspid and operates in the direction of the arrow, as shown in Fig. 3.

FIG. 5.

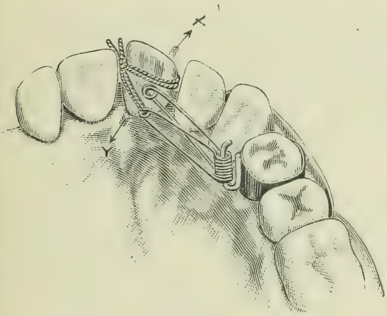
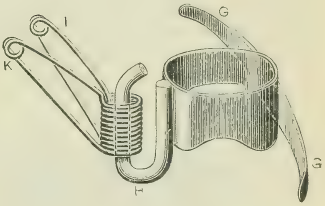
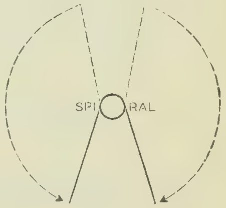


FIG. 6.



To Rotate One Tooth in its Alveolus.—In this case (Fig. 5), we use *both* wings of the spring as a driving force. This apparatus has much likeness to that just described, as it also consists of a band with a support soldered on the labial surface, Fig. 6, *g g*. The hook *h*, soldered on the lingual surface, serves for putting the spring into use.

FIG. 7.



After this device is fastened with cement on the first bicuspid, we at first turn the wings of the spring over one hundred and eighty degrees (Fig. 7). Now we put the spiral on the hook *h*, so the wing *i* will press on the distal side of the tooth to be regulated, and operate in the direction of the arrow *x*, Fig. 5.

A silk ligature is now attached to the tooth, and the knot made on the labial surface. One end of the string is drawn through the eye of the wing *k* and fastened with the other end of the string to another knot, and the wing *k* will draw the tooth in the direction of the arrow *y*, Fig. 5. In this way the tooth is turned with perfect equality of action by both wings of the spring.

To Turn Two Teeth at the Same Time.—Among the many forms of dental irregularities the following cut, Fig. 8, represents one which is very common; the central incisors being situated more or less at right angles to the line of the arch. Both teeth are encircled by a well-fitting band. A hook is soldered on a little back of the space between the central and lateral incisors, Fig. 9, *l m*.

Now the bands are fastened with cement, and we only have to put the regulating spring into use (see Figs. 8, 9). The wire ends of *l* and *m*, Fig. 9, are to be turned over again. The arrows in Fig. 8 show the action of the spring.

FIG. 8.

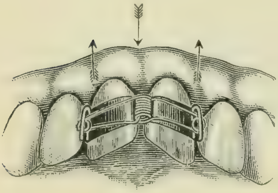
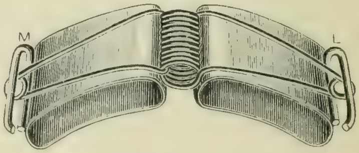
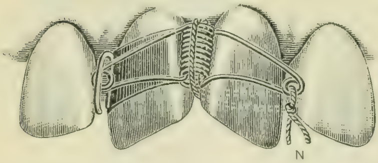


FIG. 9.



If there should not be enough space for two bands, fix one with a hook as usual, and for the other use a silk ligature, as shown in Fig. 10. We pass the string through the spiral, bring up both ends across the lingual surface to the eye of the wing *n*, Fig. 10, and fasten there by a knot. The result is exactly the same as before.

FIG. 10.



The teeth regulated as described above can be easily retained in place until they have become firm in their new positions by using the band already fitted to the tooth to be regulated, and soldering a piece of wire on the lingual or labial surface, as the case may require. By this means the appliance is converted into an efficient retaining fixture.

The ends of this wire should be left a little long, so they will have a support against the neighboring teeth. This retainer should be worn until there is absolutely no danger of the teeth returning to their former positions.

◆

PROCEEDINGS OF SOCIETIES.

AMERICAN MEDICAL ASSOCIATION—SECTION ON DENTAL AND ORAL SURGERY.

THE forty-seventh annual meeting of the American Medical Association was held in Atlanta, Ga., beginning Tuesday, May 5, and continuing four days.

The Section on Dental and Oral Surgery met in the ladies' parlor of the Kimball House; Dr. R. R. Andrews, of Cambridge, Mass., in the chair.

The Section was called to order at 3 P.M. After hearing the report of the Committee of Arrangements and adopting the same, the president read his annual address, of which we give the following abstract:

We are here not for the consideration of the various kindergarten processes which go to make up the ordinary technique of our everyday affairs, but rather for the consideration of the higher themes in the realms of scientific research. Our aim should be to search a little farther into the borders of the unknown. Some of the theories of yesterday have crystallized into the facts of to-day, and the knowledge gained benefits our whole professional brotherhood. The year has given us a most valuable and brilliant series of experiments conducted on an accurate scientific basis, by which we know more of the physical properties of the teeth and of the various filling materials. These are to be noted as added treasures to our common knowledge.

There has also been much thought given to the subject of electric medication. By the latest cataphoric methods extremely sensitive teeth are completely obtunded, and those badly discolored are successfully bleached.

Our special schools are constantly advancing their standards, and the graduates are taking a higher ethical and professional standing wherever they go. We look forward to the time when our students shall become the students of a medical university, where all the specialties of the healing arts are taught, and where a common degree shall be given to all.

It has been said that a man speaks best when speaking of a subject that is familiar to him. I shall therefore call your attention to the consideration of the finer processes which take place in the building up of enamel. To this subject I have given much thought and original research.

In the February number of the DENTAL COSMOS of the current year was an original communication on the formation and structure of dental enamel, by J. Leon Williams, of London. The paper was read in substance before the Royal Society of Great Britain on December 12, 1895. In this article he advanced new ideas in regard to the finer processes of enamel-formation, and illustrated his paper with reproductions of his photo-micrographs, which are the finest that have been shown, or rather the finest that I have ever seen.

While fully recognizing the worth of Dr. Williams's investigations in this field, I propose to criticise, in a friendly way, some of his theories, as they differ somewhat from my own conclusions arrived at after giving this subject a good deal of time and careful investigation, while writing my Berlin paper in 1889. In the article to which I have referred, Dr. Williams makes this statement: "The stratum intermedium performs a much more important function in the process of enamel-building than has heretofore been supposed." He calls the reader's attention to the fact, well known before, that between the enamel-cells and the stratum intermedium is seen a narrow band which is a clear, sharply marked, and differentiated line separating these two layers of cells which have heretofore always been represented as closely connected. He says that writers of acknowledged authority speak of the ameloblasts as being constantly renewed from the stratum intermedium. He also states that the other end of the ameloblast lying next the forming enamel is also bounded by a similar line. These appearances are not new; they are familiar to all investigators. They have been constantly seen when studying the earlier stages in the growth of the enamel.

The band, or, as he names it, the membrane between the stratum intermedium and the enamel-cells, is not constant. This is clearly seen in several of his illustrations. During the time of my own investigation of the enamel, I gave considerable attention to the consideration of these appearances, and was then led to believe that they were merely stages in the growth of the young tissue. Some sections would show it; in others it was absent, each section showing the picture at the point where death left it. In many of my sections the enamel-cells were in direct contact with the cells of the stratum intermedium; some of them seemed to be actually passing down into the enamel-cells, as though they were to become ameloblasts, and there was no appearance of any tissue between them. This is why I think the enamel-cells are supplied from this layer. Others have noted the same appearance.

In a paper read at Chicago, at the late Dental Congress, I demonstrated that there is in the developing enamel, as had already been found in the developing dentine, a fibrous substructure. I there clearly demonstrated by my photo-micrographs that this fibrous substructure originated either in the cells of the stratum intermedium or from the embryonic connective tissue just beyond. My photographs showed this fibrous tissue bridging the space where I had teased a layer of enamel-cells from the cells of the stratum intermedium. I do not believe there is any such tissue as the membrana præformativa, as described by the earlier investigators. At the inner surface of the enamel-cells toward the enamel, this tissue, under the microscope, has the same appearance as that which is found between the odontoblasts and the formed dentine. It is a layer of a semi-solid gelatinous tissue which investigators have named "border-land tissue," always to be found between the calcified tissue and the cells that form it. This band is so narrow at times that it is scarcely to be seen, and sometimes it is as wide as the layer of cells. As I have stated, these different widths indicate stages in its growth. In this layer are to be found numerous connective-tissue fibers, first noticed by Mummery, of London, and into it the matrix-forming material is deposited.

With my present knowledge, I cannot consider the layer between the enamel-cells and the enamel a membrane, and indeed Dr. Williams considers it doubtful, for he states that it is impossible at present to speak definitely in regard to its origin, exact structure, or function; but he considers it plays an important part in the elaboration of material for enamel-building. In this I agree with him, for it is, I believe, the gelatinous material that forms the inter-enamel rod substance.

Dr. Williams now passes to consider another feature of the enamel-forming organs,—the stratum intermedium. He states that these cells have heretofore been supposed to perform no particular function until the formation of the enamel-prisms was completed, when, it is believed, they undergo some modification of form and become calcified as the outer cuticular layer of enamel known as Nasmyth's membrane.

In explaining the origin of this membrane I differ with Dr. Williams, for I believe Nasmyth's membrane to be formed from the layer of ameloblasts left after the formation of the enamel is completed. Dr. Williams says that he is able to show that the cells of the stratum intermedium constitute a no less important factor in the formation of enamel than the ameloblasts; indeed, he says it would appear that they are the more active of the two so far as concerns the selection of the proper material for enamel-building. Again I cannot agree with him. The selection of the material for enamel-building, the lime-salts themselves, comes, I believe, directly from the blood-supply everywhere found against the stratum intermedium after calcification commences. As I stated in my Chicago paper, I believe that the cells in the stratum intermedium are the origin of the fibrous substructure which serves as a scaffolding to build up the young enamel. There is a possibility that this fibrous tissue, which I believe I have clearly demonstrated to be present, may originate from the connective tissue of the jaw which is against this layer; in fact, I have been somewhat in doubt whether or no the cells of the connective tissue of the jaw did not take the place of this layer after calcification had advanced, for in many sections it is difficult to distinguish anything but connective-tissue cells against the ameloblasts.

Dr. Williams continues, "It has for many years seemed clear to me that the enamel-organ, and more especially the stratum intermedium, should be classed among the true secreting tissues." He states, "I am not able to understand how so many good observers have failed to see the intricate plexus of blood-vessels which is very early developed in this layer of cells. Wedl, Magitot, Legros, and Sudduth say that they have uniformly failed to detect a blood-supply within any part of the enamel-organ proper. And yet in a large majority of my photographs it is as plainly evident as the ameloblasts or the stellate reticulum." Dr. Williams cannot mean that there is an intricate plexus of blood-vessels developed in the cells of the stratum intermedium, these cells having their origin from an epithelial source. The stratum intermedium is wholly within the enamel-organ, and, after calcification has commenced, only that portion that is in direct contact with the true enamel-cells has any significance. The blood-supply does not originate in this.

I cannot believe Dr. Williams agrees with Heitzmann and Bödecker in their idea that the stratum intermedium of the enamel-organ is a kind of connective tissue. No, this intricate plexus of blood-vessels has its origin in the true connective tissue of the jaw. It is found next the stratum intermedium after calcification commences. I have seen indications of it just outside the enamel-organ before the calcifying process commenced; never within the enamel-organ. I have never studied tissue from the jaw of the mouse or rat, consequently I have never seen the appearance which Dr. Williams illustrates; nor do I believe the tissue of the stratum intermedium, as shown, to be glandular tissue. In the jaw of the rodent, where the enamel is being constantly supplied as it is worn away, it would seem necessary that there should be a larger blood-supply, and but natural that these numerous capillaries take the form of papillæ, being so constantly active; but I fail to see that this implies that the tissue of the stratum intermedium filling up the spaces between the papillæ should necessarily be glandular.

Dr. Williams continues, "Several observers of distinction, notably Dr. R. R. Andrews and Professor Spee, have described the development of enamel as a process in which the tissue is formed by the deposit of droplets or spherules of calcoglobulin. This view is undoubtedly correct, but, as stated by the authors mentioned, it does not include all of the phenomena that may be observed. The first important fact to be mentioned concerning the appearance of droplets or masses of calcoglobulin in the ameloblasts is that the process is an intermittent one. Sometimes the cells on one side of a developing tooth will be full of these masses, while on the opposite side there are none to be seen." . . . "The ultimate structure of completely formed enamel shows that it is built up by the deposit of bodies which are of very nearly uniform size. There is, as we shall see, no uniformity in the size of these masses of calcoglobulin, neither is there anything in their structure which corresponds with that of formed enamel; in fact, under the finest lenses that are made they show as highly refractive masses without definite structure. Although they are usually more numerous at the inner ends of the ameloblasts, next to the forming enamel, they may be seen throughout the entire length of these cells, and I have often seen them lying close up to the membrane which separates the ameloblasts from the stratum intermedium. Occasionally I have espied them when they seemed to be actually in or emerging from this membrane. It is possible, and I think highly probable, that this substance, although appearing in the ameloblasts, is really formed in the more specifically secreting cells of the stratum intermedium."

If the stratum intermedium, which is an epithelial product, plays so important a part in the formation of calcoglobulin "for enamel matrix," why do we not find the same stratum intermedium in the dentine germ, where calcoglobulin is also being constantly formed for dentine matrix? Dr. Williams is an excellent observer, but he seems to be taking steps into the darkness in this statement, "The calco-spherites, which I believe to be the only matrix formers, are but partially formed in the protoplasmic fluids of these cells." Their origin is wholly from the blood-supply. This alone gives the lime-salts, which, passing through the fluids of the cells to the ameloblasts, become the calcospherite, probably in the identical way as do the salts of lime in the presence of organic fluids as was seen in the brilliant experiments of Mr. Rainey, Dr. Ord, and Professor Harting.

It will be remembered that the contents of the ameloblasts were always spoken of as granular until I called attention to the fact that the contents were globular, not granular, as early as 1878, and as they pass down into the ameloblasts they are so minute as hardly to be seen with our best lenses. It is only when they are within the ameloblasts below the nucleus that they are easily seen as minute globules. At the ends of the cell nearest the enamel they take the shape they assume, probably by coalescing. They are somewhat larger than the rod they are to form, but seem to be drawn into the size of the enamel-rod by compression. My photo-micrographs illustrate this beautifully. The large masses of calcoglobulin seen in some of Dr. Williams's photographs are, I think, post-mortem changes where many globules have coalesced, forming the large abnormal masses. I have seen them coalesce from pressure on the cover-glass while examining specimens. It is only when the globules are against the enamel and fixed by partial calcification that they show their real size. My investigation teaches me that it is probably impossible that there can be two sets of globules, each of a different nature, forming in the enamel-cells, as stated by Dr. Williams. His statement that almost every different method adopted is certain to produce a greater or less modification of conclusions I have found to be true, and it was only after working over hundreds of sections and finally finding a way to prepare the tissue very near the life of the animal that I came to the conclusions which I gave in my Chicago paper.

Speaking of the appearance of fibers in the young enamel he says, "The ameloblasts are raised from the developing enamel, and, projecting into the space thus formed, we see strings of the albumen-like material which sometimes extend quite across the clear part of the field. In several places these strings are seen to be drawn out from the transparent droplets. Whether these strings be drawn out from the interior of a calcifying enamel-rod, as described by Mr. Charles Tomes, Dr. Graf Spee, and others, or are merely an extension of one of the transparent droplets, they are evidently always produced by the same material and substantially in the same manner,—viz, by the drawing out or extension of an albumen-like product of the enamel-organ." In this Dr. Williams loses sight of the fact, which I then clearly demonstrated, that there are fibers and many of them appearing like the fibers of connective tissue, passing from the cells of stratum intermedium through and among the ameloblasts. He further remarks, "But whether in the form of droplets or strings this substance is probably calcoglobulin, an albumen-like material holding the calcific material, or at least some portion of it, in solution."

I think I have proven conclusively that these strings have a fiber foundation. Allow me to quote from my paper: "Appearances of calcified fibers projecting beyond the line of calcification I had already seen in forming enamel, and I commenced a series of investigations to see if I could find out what these appearances indicated.

"I commenced by trying to tease apart enamel-cells; after some little experimenting I am quite sure I found evidence that processes from the cells of the stratum intermedium of the enamel-organ pass down through and among the ameloblasts to the forming enamel beneath. And I judge that these are the processes which Mr. Tomes saw and described as processes connecting the enamel-cells with the cells of the stratum intermedium. I then commenced a series of experiments, trying to separate slightly the layer of enamel-cells from the stratum intermedium. The parted edges had the appearance of broken processes, and in several specimens there are processes crossing from the enamel-cells to the stratum intermedium." And further, "Connecting with the fibrous net-work and running to the formed enamel beneath, we find innumerable thread-like processes, appearing like fibers. . . . . To sum up my conclusions: I am led to believe that there probably exists in developing enamel, as has already been found in developing bone and dentine, a fibrous sub-structure on and between which the enamel is deposited. After the enamel is wholly formed, its existence seems to be wholly blotted out in the dense calcification of the tissue."

Dr. Williams's strings of calcoglobulin are really these fibers coated with an albumen-like product. This I think I have proven to my own satisfaction. When coated with this material, as they most always are, they look as if they were pulled out of a semi-solid substance. These matrix-forming globules laid against the enamel already formed, but not wholly calcified, are, by compression, drawn into the form of the future enamel-rod and there fully calcify,—as do also the fibers which serve as their scaffolding, and the albumen product that becomes the inter-enamel rod substance. This I believe to be the process of enamel calcification, stated in few words. The enamel-rods are, as Dr. Williams says, built up by the successive rhythmical orderly deposit of these bodies of uniform size. The larger more transparent irregular masses which he describes and which I have often seen, are only an aggregation of these same orderly deposits of uniform size which have for some unknown reason become fused or coalesced into the irregular mass. They are, I believe, post-mortem changes, and of this fact I feel assured, because I have seen so many evidences of it, not only in studying the enamel, but while studying dentine calcification, where the proof seems absolutely conclusive.

In his paper, Dr. Williams has added a substantial contribution to our knowledge in showing us, for the first time, that the so-called stellate reticulum is simply an intercellular substance which is left after the removal of the cell contents. I had thought, with Dr. Sudduth, that the cells of this tissue must be a modified form of those cells composing the middle layer of the oral epithelium, changed from the polygonal to the stellate form, yet I never understood how the change was brought about ; but Dr. Williams explains it. He says the cells undergo some change which renders their contents more watery, and thus they are easily washed away in preparing the sections. He clearly shows the cell contents, in his recent photomicrographs, filling in the spaces between the stellate tissue. They are very perfectly nucleated cells lying in the so-called stellate reticulum, which is really the slightly modified cell wall He says that certain methods of treatment of the oral epithelium will produce appearances closely resembling the usual illustrations of the reticulum of the enamel-organ. He shows that what has been called the nuclei of the stellate reticulum are simply the corners of other polygonal cells which have been cut across in making the section.

In closing, I would say that I fully realize the good work Dr. Williams is doing for his profession in writing this series of papers. I know something about the self-sacrifice that such investigation costs. By the use of the finest modern objectives, he has given to us photomicrographs that are wonderfully clear in every detail,—photographs that would show the reticulum of Heitzmann and Bödecker if it were there. After carefully studying sixty or more of these pictures, I see no reason to change my views expressed in my Chicago paper. I do realize their beauty, and know something of the skill required to perfect them. In these finer points in the development of the dental tissues, especially of the enamel, there must necessarily be a good deal of obscurity which future investigation will probably clear up.

I shall try to do something toward this end, and shall always welcome the views of other workers. I feel assured the best results will be brought about by a comparison of ideas on the different points in question, and I stand ready to change my views when I am convinced that I am in error.

(To be continued.)

NEW YORK ODONTOLOGICAL SOCIETY.

A REGULAR meeting of the New York Odontological Society was held on Tuesday evening, March 17, 1896, at the New York Academy of Medicine, with the president, Dr. William Carr, in the chair.

The minutes of the last regular meeting were read and approved.

Dr. E. S. GAYLORD. My clinic this afternoon was to demonstrate the chemical treatment of pulp-canals by the use of acids and alkalies, whereby the canals are enlarged and rendered perfectly aseptic to the apex. While the use of acid is not new, yet the combination I think is new, and due credit should be given Dr. A. C. Hull, of Worcester, Mass., who was first to give a public demonstration of this method, a full descriptive report of which may be found in the December number of the *Dental Digest.* For the benefit of those who were not present this afternoon, I will explain briefly the operation. After applying the rubber-dam (which should never be omitted when so powerful drugs are used) we open (with the engine) into the pulp-chamber and gain access to the canal or canals, then by means of a very neat little instrument devised by Dr. J. T. Barker, of Wallingford, Conn., sulfuric acid is introduced into the canals, and with a fine Donaldson broach it is coaxed the entire length of the root, remaining about one minute; then by a strong solution of bicarbonate of soda the acid is neutralized. The reaction serves to throw out all débris. Wash with pyrozone to remove all crystals of sulfate of soda, dry cavity and canals, then introduce hydrochloric acid, coaxing as before with the broach; this is neutralized with chlorinated soda, which also bleaches as well as cleanses the interior of the chamber and canals; after thorough dehydration the canals may be filled permanently or temporarily at the discretion of the operator. Since I witnessed Dr. Hull's clinic last October I have treated about twenty teeth in this manner, and am convinced they are more thoroughly aseptic than any of previous treatment. Dr. Hull has used this method about four years with the greatest success, and I feel sure those giving it a fair trial will be satisfied of the thorough manner in which the combination does its work.

Dr. A. L. NORTHROP. What is the real necessity of changing from sulfuric acid to hydrochloric acid?

Dr. GAYLORD. I can make no better reply than by quoting Dr. Hull, he having more experience in this treatment, and I think his deductions quite correct. Dr. Hull says, "The reason for this change is that we are nearing a point where we are to take into consideration not only the tooth-structure, but the tissues beyond the apex; therefore I substitute HCl (hydrochloric acid), which has, in addition to its escharotic effect, disinfecting properties; also, as a tonic and astringent it is of great value in the treatment of tissues beyond apex, in cases of induration and soreness."

Dr. Northrop. Although the explanation seems to be clear, I cannot see any reason why the change should be made from the sulfuric acid to the hydrochloric acid.

Dr. Gaylord. One particular point Dr. Hull makes is that you get a thorough and decided action from the combination of the chlorinated soda and the hydrochloric acid. You get it quicker and to a greater degree.

Dr. Northrop. You get it from the sulfuric acid?

Dr. Gaylord. I think not so positive.

Dr. H. W. F. Cady. When Dr. Walker invited me to attend the clinic I did not know that I should have any cases to show, but was fortunate enough to have two to bring this afternoon. I have had an unusually large number of cases of necrosed jaws this winter. Last month I had six cases. The child exhibited at the clinic this afternoon is two years old. It had had measles, and after it recovered it developed a necrosis in the region of the premaxillary bones. I removed the deciduous teeth and some necrosed bone, and washed out the cavity thoroughly, and supposed that would be sufficient; but the necrosis extended until this morning I operated under chloroform, removing the crowns of both permanent central incisors partly developed, and also bone, which left an opening into the nasal cavity. I packed the cavity with iodoform gauze, and hope to have it granulate and close the opening into the nose.

The other case I showed here was of a woman forty years old. The necrosis originated from an alveolar abscess. She had been under treatment for that, and supposed it was cured. Becoming very much debilitated, she consulted with her family physician, who was a surgeon in a dispensary. He discovered necrosis of the bone in the jaw, and turned her over to my clinic at the DeMilt Dispensary. I administered gas and took out a piece of bone which involved six teeth from the central incisor on the right side, including the second molar. I packed the cavity with iodoform gauze, and it is granulating and filling up nicely. The antrum was not involved. There was an opening into the nose. I hope to close it up entirely, and after it is closed I shall make her a plate.

Dr. H. Hanning, of Brooklyn. This is a dispensary case of necrosis. The man is of Spanish and Mohican parentage. He is sixty-four years of age, and neglects himself. About March 1 of last year his face swelled considerably. For a year previous to that he had been troubled with an abscess of the lower right first molar. For some time he did nothing about it, but finally went to a dentist. The man is very dark and looks like a negro, and the dentist, not caring for the case (perhaps for the color reason), sent him over to the dispensary. He (the dentist) lanced the gum. The swelling was reduced, but the patient obtained no relief. On March 27 I saw him, and the gums were very sore to the touch and were very much swollen. Most of the swelling was over the first molar. I extracted the first molar to evacuate the pus, which was thick, yellow, and very offensive. Threw the tooth on the floor, thus losing part of the specimen. I waited for the sequestrum to form. On April 22 I removed the sequestrum, and applied aromatic sulfuric acid. I took a silver probe and felt a few small pieces of necrosed bone, which I removed with the probe ; then took a swab of absorbent cotton on the end of the probe, and dipped it into aromatic sulfuric acid and thoroughly wiped out the wound. The gum became white, but there was no pain. I saw him again on May 10. At that time the bone was hard, and there was no further necrotic action. I packed in a small piece of iodoform gauze to keep food out of the wound. I do not believe in packing gauze in, because it keeps the wound open. The trouble with necrosis cases is that they are often packed too tightly, and the wound remains open too long. In about five weeks the wound was entirely healed. I saw him three days ago. The gum is just as healthy as though the bone had never been affected. The man has since allowed his lower cuspids to abscess, and necrosis has again set in. He had a stroke of paralysis in the mean time. His physician, with whom I consulted, advised me to leave him alone. He said he was a charity patient, and one who could not be controlled, and if septicemia should set in, results might be serious.

Dr. S. G. PERRY, on behalf of the society, read the following minute, which was adopted as expressing the sentiments of the members with respect to Dr. W. H. Dwinelle :

The rapid years have gathered one more of the great men of our profession to his final rest.

Dr. William H. Dwinelle, whose life we commemorate and whose death we mourn, was one of the great figures in the early days of our young profession. Entering it at a time when it was struggling for recognition among the learned professions, he brought to it the influence of a remarkable personality, and through his varied attainments, and by his energy and hopeful confidence, he helped, as few others did, to place it upon a secure foundation among the learned and liberal professions of the world.

Fitted for the practice of medicine and surgery, he yet saw in the specialty of dentistry a wider field for the exercise of his peculiar genius, and he entered upon his work with boundless enthusiasm.

This is shown by his numerous inventions, his brilliant operations, and his contributions to the professional literature of his time. It is also warmly attested by the few surviving companions of those early days.

He assisted in the formation of the first dental college, and was instrumental in establishing the *American Journal of Dental Science*, one of the most dignified and influential journals our profession has produced.

He performed surgical operations in the oral cavity that were the admiration of the general surgeons of the day, and he performed operations upon the teeth that had never been attempted before.

Many examples of his work are still in existence, to testify to his remarkable ingenuity and to his unusual skill.

A man of warm heart and generous impulses, he freely gave to all who came ; his office was always open, and he was ever ready to show his instruments and his methods to any one who desired to learn.

Having practiced medicine and surgery before he entered the dental profession, he commanded the confidence of physicians and surgeons, and was thereby able to help, in an unusual degree, to secure recognition for our specialty, and he stood for many years as a bond between the parent profession and its young offspring.

A man of literary tastes, and a devoted lover of art in all its forms, he was able to reflect credit upon our profession at a time when such influences were more needed than at present.

A man of tender sensibilities, he was a genial companion, and his wide sympathies and varied talents made him a great favorite among cultivated people.

He was a man of so many gifts that he could have been a poet, an actor, an artist, a sculptor, or a litterateur. This wide range of talent made him always an agreeable friend.

Before the bar he would have been a great advocate; in the medical profession he would have been a great physician or a great surgeon. He chose to be a great dentist.

For this we honor his memory, and we think it fitting that this society, once presided over by him, should place on record its appreciation of him while living and its sorrow for his death.

A. R. Starr,
William Jarvie,
S. G. Perry, *Chairman.*
Committee.

[Remarks eulogistic of the character and attainments of Dr. Dwinelle were made by Drs. Jarvie and Perry, which we are compelled to omit from lack of space.—Ed. Dental Cosmos.]

At the close of Dr. Perry's eulogium the following preamble and resolution was offered by Dr. W. W. Walker:

> "As it is the intention of the New York Odontological Society to continue the monthly clinics started under such favorable circumstances,
>
> "*Resolved,* That such clinics be hereafter known and designated as the Dwinelle Clinic, given under the auspices of the New York Odontological Society."

Resolution carried.

The secretary moved that the resolutions be spread in full on the minutes. In respect to Dr. Dwinelle's memory, the president asked for a rising vote on the resolutions.

Carried.

The paper of the evening was then read by Dr. M. L. Rhein, of New York City, entitled "The Oral Expressions of Malnutrition."*

Discussion.

Dr. S G. Perry. It would not be possible to enter into a discussion of the subject. I will only venture a few practical suggestions on the treatment of such cases as have been described: hot water before breakfast, hot baths, rubbing of the skin, reasonable exercise, and one thing that has not been sufficiently laid stress upon, and that is rest. In these modern times we do not get enough rest. If we do not rest, we cannot feel well; and if we do not feel well, we cannot work to advantage. I recommend the use of pure water to wash out the kidneys. Poland water is probably the best, because it is the purest and the hungriest for the substances that it will dissolve in the body. If you keep the kidneys active, you will feel pretty well. You must so select your food that the liver will behave well, because the liver is the first of the great eliminating organs. It performs the most important function, because it prepares the way for the natural action of the kidneys. Probably one of the beginnings of Bright's disease may be traced to the faulty action of the liver. I am only giving my view of the matter from a practical standpoint of the paper.

Dr. Pease. I agree with Dr. Perry that rest, and food which is easily digested and assimilated, are of the first importance. I have a case in mind, in my own family. The patient has been on milk only for over a year. Under meat, the tissue showed signs of breaking down, and the entire system was disintegrating, but under milk there has been a gain of forty-three pounds in weight, and the tissues of the mouth are fine. At one time they became somewhat spongy, but a little salt added to the milk overcame that condition. No solid food is allowed at any time. In reference to the tissues, I have found in my practice that the homeopathic remedies work like a charm. I have some cases on record before the medical societies, of pyorrhea, where the tissues would not tolerate the teeth, and the teeth were being pushed right out ; nothing would keep them in except a forcible retention by bands, and even then the tissues would hardly tolerate them. Local treatment was of no avail, but the tissues responded promptly upon the administration of the indicated homeopathic remedy. I have some allopathic patients, and they are strong allopaths, too, who say they cannot understand the wonderful action of those little pellets. In regard to the washing out of the kidneys, I have two patients now, one improving very rapidly, and the other on the way, by getting rid of the broken-down material through the kidneys. I will not attempt to discuss the paper any further at this hour.

---

* For the paper in full, see page 486 of the current number.

Dr. M. L. RHEIN. Just a word in regard to what Dr. Perry said about Poland water. In a paper of this kind it is impossible to enumerate each little detail, but I make a strong point of urging my patients to use water as pure as possible, and prefer Poland to any other water. I believe the purer the water is, the more material it will remove that we want excreted from the kidneys, and also, as I mention in my paper, do I dilate upon the question of rest. I thoroughly agree with a little article of Dr. Bulkley on the beneficial effects of sleep in disease. In pyorrhea, it is of the most inestimable value to get your patients to have what is known medically as sound sleep. I am sorry that in Dr. Perry's and Dr. Pease's minds the main point of my paper was lost. Perhaps I read it hurriedly, but I tried to make clear the fact that where there is uric acid, either in excess in the system or retained there, has no relevancy and cannot be attributed to any one disease. In other words, if we are discussing a case of this kind, we must discuss the case according to what disease has produced it. Perhaps the case that Dr. Pease speaks of is one where there is great difficulty in digestion, where very likely the intestinal tract is inflamed and in an irritable condition. It is absurd to discuss such a case with one of gout, or with one of tuberculosis. We must take the cases and discuss each by itself. That is one point that I think has always been lost sight of in discussing pyorrhea. The man who speaks of a case should say it is a case of rheumatic pyorrhea, or of tubercular pyorrhea, or whatever it is, and for that reason I have gone into the details of these cases to show how different they are from one another. Every one knows that they vary greatly, and so the treatment should be varied accordingly.

In regard to the point that Dr. Perry brought out about Haig, I want to say that his position of the relative proportion of urea to uric acid has been exploded by the best authorities on that subject. They have shown that uric acid and urea have no relation to each other, and that urea is dependent upon food and it is not harmful. It will increase in ratio to the amount of albuminous food, and the amount of albuminous food will have nothing to do with the uric acid ; but the uric acid has a distinct relation to the number of white corpuscles in the blood, and this amount is dependent upon the amount of disintegration in the nucleins in the tissue.

Subject passed.

Adjournment.

JOHN I. HART, D.D.S.,
Editor Odontological Society.

[NOTE.—The remarks attributed to Dr. H. W. Northrop in our issue for April were made by Dr. A. L. Northrop; and Dr. S. Freeman, not Dr. W. W. Freeman, was the speaker quoted in our May number in the proceedings of this society.—ED. DENTAL COSMOS.]

AMERICAN DENTAL ASSOCIATION.

(Continued from page 356.)

FOURTH DAY—*Morning Session* (Continued).

A COMMITTEE, consisting of Drs. Grant Molyneux, Frank Holland, and J. G. Palmer, was appointed to investigate conflicting claims as to the invention of the electric oven.

Section VI, Physiology and Etiology, was then called. Dr. J. D. PATTERSON, of Kansas City, the chairman, read the report, of which an abstract follows:

While there have not been many notable new theories advanced during the year, the committee feels impelled to say that the interest in the physiology and etiology of diseased conditions is steadily increasing; so that the profession is just a step in advance of the position held a year ago: evidencing a better professional spirit, which must ever be the outcome of the study of physiology and etiology.

The report then quoted a number of the principal points made in the record of the investigations of Dr. Black printed in the DENTAL COSMOS of 1895. The conclusions of Dr. Black are that the apparent immunity from caries of the teeth which occurs in practice may be through some power or influence acting through the medium of the oral fluids to produce the differences which are forced upon our notice.

The report then referred to a paper read before the Kansas State Dental Association by Dr. E. Bergstresser, giving a complete history of investigations upon this point. The author makes practical application of the discoveries, and concludes as follows:

"In the treatment of many diseases that come under his care the dentist has frequently overlooked the fact that Nature has a most efficient germicide, soluble and everywhere present, in the blood-serum. The appalling list of escharotics and other powerful medicaments that are used in the treatment of pyorrhea alveolaris under these circumstances appears often unnecessary after thorough surgical removal of the exciting cause. It is utterly impossible for the oral surgeon to perform a perfectly aseptic operation, from the very nature of the local environment. Yet no other class of surgical cases heal so kindly. The blood-supply of the face and head is so abundant that Nature seems to be able with her own germicidal agent, nuclein, to do far more than the best aseptic surgery can accomplish in any other part of the body. This should be a strong hint to all of us. If more dependence were put on cleanliness and thorough surgery, and less on powerful and irritating germicides, Nature, through her own superior means, would show us results that are now seldom attained."

The report concluded with the announcement of a paper by Dr. A. W. SWEENY, of Washington, detailing a case in practice. Dr. Sweeny's paper, of which an abstract follows, was read by title, describing in detail the treatment of a case in which the etiology was obscure. Patient, a gentleman in middle life. Near the junction of the lip with the gum over the root of the left inferior central incisor an irregular, nearly circular opening about an eighth of an inch in diameter extended through the gum and alveolar process, exposing the apex of the root. At its upper border an extension or fissure nearly as wide as the edge of a ten-cent piece extended toward the gum margin. Opposite the apex of the root the opening was from an eighth to three-sixteenths of an inch deep, with some congestion caused by a few loose pieces of process. There was no discharge of pus, and an application of pyrozone failed to produce frothing. The nerve connection was severed, and there were several small dark specks of calcareous deposit about the apex of the root; but the strip exposed by the fissure was perfectly clean, and there was no deposit whatever about the neck of the tooth. The patient, who takes excellent care of his teeth, said there had been no soreness or swelling. He simply discovered the opening a few weeks before. The spring previous Dr. Sweeny had found the general state of affairs about the mouth excellent, without a sign of "pocket."

The loose pieces of process were first removed about the apex, then the tooth was entered from the lingual side, the remnants of the pulp removed, the canal disinfected and filled, the denuded portion of the end of the root amputated, the edges of the cutting-surface rounded off, and the cavity in the process cut out with a bur. After considerable consultation he tried sponge-grafting, which failed promptly; then alumnol, water, and Ceylon cinnamon, as recommended by Dr. Harlan, were used, the patient being directed after each meal to carefully and thoroughly cleanse out every particle of food. The improvement under this treatment was slow but steady, until the patient suffered a nearly fatal attack of rheumatism, during which, owing to the severity of the illness, the treatment was intermitted. After the critical state of the patient's illness was over, everything was still in a fairly favorable condition, and the trained nurse in attendance undertook to keep the opening free from particles of food, which the patient could not yet do for himself. Thioform, which is in the form of a very fine powder, tasteless, nearly odorless, non-toxic, styptic, and antiseptic, was used. Further improvement was shown, so that at the time the paper was written the opening at the end of the root had filled up entirely, and the fissure, which after the first visit extended itself clear to the free margin of the gum, was contracted. Taking all the circumstances of the case into consideration, Dr. Sweeny was of the opinion that the case was one of those to which Professor Peirce has called attention, where the calcareous deposit first formed on the apex of the root independently of any break in the gum margin or encroachment of tartar from the neck of the tooth, and the loss of tissue commenced from within and slowly and painlessly extended outward. The severe and long-continued rheumatic attack following the manifestation of the local lesion was both interesting and suggestive. The patient, while never a sufferer from true gout, has several times experienced severe attacks of rheumatism similar to that which intervened during the treatment of the case.

Dr. ALONZO BOICE, secretary of Section I, reported a paper by Dr. H. H. BURCHARD, of Philadelphia, to be read by title. The paper was entitled, "Some Principles of Bridge-Work."

Dr. Burchard considered that bridge-work has been practiced for a sufficient time to warrant the deduction of some guiding principles. As a preliminary he suggested, first, that no one is justified in practicing bridge-work unless he possesses an exhaustive knowledge of the surgical aspect of dentistry, combined with the skill of a finished mechanician ; second, Is a bridge demanded by the conditions present? and not, Is it possible to apply one?

There are two aspects to this variety of work, one mechanical, the other physiological. Under the first are included the laboratory art of the prosthetist together with all considerations of mechanical resistance to stress, and the effect of force and stress as expressed in the movement of the abutments of the bridge or of any part of it. It is assumed that the laboratory operations are done as they should be. Each tooth of a denture is by its anatomical position, its structure, and support, designed to sustain a force in a certain direction or directions. Force in excess of the normal amount is a menace to the tooth's integrity. By connecting two or more teeth as with the abutments of a bridge, their original mobility is modified. While such fixation may produce an increased resistance, in the vast majority of cases this is outweighed by the lateral stress. Commonest of all mechanical faults is undue strain.

The construction of bridge-work is based upon engineering principles, and should be made to accord with those principles. It should be viewed as a bridge, as a continuous surface supported by fixation at two or more points designed to bear safely a calculated amount of strain. An examination of some of the devices designated dental bridges will show numerous instances of violation of the simplest engineering principles. Pieces are placed with but little apparent regard for the forces received or the nature and direction of the strains tending to dislodge the appliances. Examples may be found in what are known as extension bridges, in which the effect is that of a lever producing rotation, which, if the crown be firmly fixed, must be of the root itself. The bar anchorage is another example. Frequently this variety of anchorage is made with round or prismatic pins. It is evident that with round pins the force of incisive action, if the crown be anterior, will tend to rotate the crown as though it were swung on trunnions. With prismatic pins the slight difference in the direction of the forces received by the supporting teeth will tend to separate them, and thus draw them away from the artificial crowns to strip the fillings from the pins. The correct form for these pins is pyramidal, with the base anchored in the retaining filling. The retaining fillings of course become virtually part of the bridge, and every strain to which this is subjected reacts upon the teeth. The writer has never seen a bar anchorage in a tooth with a living pulp which was not faulty, the bar becoming loosened or the filling itself loosened from the cavity walls. With a metal spur resting upon a tooth either the bending of the spur occurs, or when this is rigid enough to withstand the strain, decalcification of the underlying enamel, or a localized gingivitis of the gum, and beginning pyorrhea at that point.

The amount of masticating surface of the bridge should be varied according to the number, position, and strength of the abutment teeth ; that is, bridges which have relatively weak support, either of number or condition of the abutments, should have the masticating area lessened in correspondence.

In a common form of bridge, cuspid roots supporting six front teeth, its retention is threatened by the leverage represented in the overbite, the extent of incisive surface, so that the longer the incisors the greater is the leverage and the greater is the demand for supplementary support of the bicuspids.

To insure the stability of the fixed bridge, it should be so constructed and adapted that neither bridge nor any part of it has any movement independent of that of the abutments. Cap crowns or partial cap crowns, if made of too thin metal and unstiffened with solder, will allow a slight movement which dislodges the underlying cement, and the space is soon filled with fermenting débris.

The physiological aspect includes the surgery of all the vital relations, not only the present conditions, but the possibility or probability of enamel decalcification, caries, or eburnitis, any grade or variety of pulpitis, or pericementitis, gingivitis, or stomatitis. An engineer knows that the permanence and stability of a bridge depends primarily upon the strength of the abutments. Using as abutments for a dental bridge any but sound teeth or roots is equivalent to an engineer building foundations in a marsh without piling.

Crowns and bridges should be so made and applied that no more opportunity is given for the action of ferments than when the natural teeth are in possession. Any part of a tooth-surface which in the placing of the bridge is put beyond the action of the ordinary cleansing agents should be protected from the ingress and contact of ferments and fermentable material. Perhaps the most common cause of the origin of a disease process due to the presence of a bridge will be found in "pockets," in which fermenting material is held in contact with the enamel ; bands are too narrow or too short, or are badly fitted, or bar anchorages are defective. Devices which have bars or pieces resting against, but unattached to, natural teeth should be excluded from the category of correct appliances, for the inevitable fermenting material must accumulate. With bar anchorages, also, the margins of the retaining filling should be finished with the same care and thoroughness as though the fillings were designed to prevent and remedy the ravages of caries, and the margins should be always accessible to the action of cleansing agents.

Contact of any part of the bridge with tissues should never produce irritation, either through roughness or undue pressure, or the formation of spaces in which decomposing substances may find lodgment. Dr. Burchard had recently demonstrated that phosphate of zinc is gradually disintegrated at the surface by action of lactic acid ;

hence the cement used as a retaining agent should be placed as nearly as possible beyond access of the fluids of the mouth.

Dr. Burchard, in conclusion, expressed his firm opinion that many patients for whom bridge-work is inserted would be better served and a greater regard for hygienic conditions evidenced had a pressure-plate been used instead of a bridge.

(To be continued.)

WOMEN'S DENTAL ASSOCIATION OF THE UNITED STATES.

THE regular monthly meeting of the Women's Dental Association was held May 2, 1896, at 4004 Chestnut street; President Dr. Elizabeth A. Davis in the chair.

Dr. Mary Gallop read a paper, subject, "Development of Children's Teeth."

The next meeting will be held at 1513 Walnut street, June 6, 1896.

HANNAH M. MILLER, *Rec. Sec'y.*,
1700 N. Sixteenth street, Philada.

EIGHTH DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

THE twenty-eighth annual meeting of this society was held in Buffalo, April 28 and 29, 1896. The following officers were elected for the ensuing year: R. Kessel, D.D.S., Buffalo, president; S. Eschelman, D.D.S., Buffalo, vice-president; W. E. Marshall, D.D.S., Buffalo, recording secretary; D. F. Bentley, D.D.S., Niagara Falls, corresponding secretary; C. W. Stainton, D.D.S., Buffalo, treasurer; S. A. Freeman, D.D.S., Buffalo, librarian.

W. E. MARSHALL, *Secretary.*

◆

DENTAL COLLEGE COMMENCEMENTS.

OHIO MEDICAL UNIVERSITY—DENTAL DEPARTMENT.

THE fourth annual commencement exercises of the Ohio Medical University, including the Dental Department, were held in the Board of Trade Auditorium, Columbus, Ohio, on Tuesday evening, March 17, 1896.

The annual address was delivered by John B. Hamilton, M.D., LL.D., and the faculty address by George M. Waters, A.M., M.D.

The number of dental matriculates for the session was sixty-two.

The degree of D.D.S. was conferred on the following graduates by John M. Dunham, A.M., M.D., president of the board of trustees:

NAME.	STATE.	NAME.	STATE.
Harry E. Brubaker	Ohio.	George L. Miller	Pennsylvania.
Augustus W. Callinan	Ohio.	Thomas M. Patterson	Ohio.
Harry Cope	Ohio.	James F. Richeson	Ohio.
Abbott G. Dana	Massachusetts.	John J. Stukey	Ohio.
Elmer E. Edenburn	Ohio.	Owen H. Thorpe	Ohio.
Edwin S. Fuller	Ohio.	Ezra S. Wagner	Ohio.
George T. Howard	Ohio.		

ROYAL COLLEGE OF DENTAL SURGEONS OF ONTARIO.

On the 21st of April the directors of the Royal College of Dental Surgeons had under consideration the report of the examiners for the session just closed, and have handed out the results as follows :

The number of students registered and in attendance for the session of 1895–96 was one hundred and sixty-one.

The following passed the final examinations and received the title of L.D.S. (Licentiate of Dental Surgery) :

W. F. Adams.
R. M. Armstrong.
T. E. Ball.
F. Britton.
J. J. Brown.
W. Burnet.
J. M. Bell.
L. G. Campbell.
H. A. Croll.
R. N. Henderson.
G. W. Hoag.
O. H. Hutchison.
J. E. Johnston.
W. E. Lundy.
J. L. Leitch.
L. M. Mabee.
F. S. Mercer.
J. F. McMillan.
H. McQueen.
C. E. Pearson.
Percy Smith.
A. T. Sihler.
J. A. Simpson.
W J. Switzer.
J. G. Somerville.
W. F. Templar.
W. C. Trotter, B.A.
Ed. D. Washington.

All of the province of Ontario, Canada.

J. B. Willmott,
Secretary Royal College of Dental Surgeons.

MISSOURI DENTAL COLLEGE.

The thirtieth annual commencement exercises of the Missouri Dental College (Dental Department of Washington University) were held in the Germania Theater, St. Louis, Mo., on Saturday, April 25, 1896.

The valedictory was delivered by Dr. Harvey G. Mudd.

The number of matriculates for the session was one hundred and three.

The degree of D. D.S. was conferred by Dr. W. S. Chaplin, LL.D., chancellor of the university, on the following graduates :

NAME.	STATE.	NAME.	STATE.
Harry K. Barnett	Illinois.	George H. Owen	Missouri.
William B. Bagby	Missouri.	Alonzo W. Rue	Illinois.
Edgar H. Bragg	Missouri.	Edward G. Simmons	Missouri.
P. T. Cunningham	Missouri.	Elmore H. Smith	Missouri.
Alfred D. Fuller	Missouri.	John M. Sloan	Missouri.
Max Fendler	Missouri.	Nathaniel B. Stanza	Missouri.
Harry M. Fisher	Ohio	William M. Tuttle	Missouri.
James F. Gwinner	Colorado.	Walter E. Urban	Missouri.
Charles J. Garcia	Missouri.	Stephen H. Voyles	Missouri.
William E. Heatherly	Missouri.	August J. Waldschmidt	Missouri.
Charles E. E. Heseman	Illinois.	Charles H. Wharton	Iowa.
Eugene J. Hume	Missouri.	William S. Wallace	Illinois.
Henry L. Jones	Missouri.	Robert D. Woelk	Illinois.
Henry F. W. Koch	Missouri.	Florian J. Wieser	Illinois.

CHICAGO COLLEGE OF DENTAL SURGERY.

The fourteenth annual commencement exercises of the Chicago College of Dental Surgery (Dental Department of Lake Forest University) were held in the Schiller Theater, Chicago, Ill., on Tuesday, April 7, 1896, at 2 P.M.

The doctorate address was delivered by C. N. Johnson, L.D.S., D.D.S., and the valedictory by William H. G. Logan, D.D.S., of the graduating class.

The number of matriculates for the session was four hundred and forty.

The degree of D.D.S. was conferred on the following graduates by Truman W. Brophy, M.D., D.D.S., LL.D., president of the college :

NAME.	STATE OR COUNTRY.
John E. Aigley	Illinois.
Edward J. Allen	Wisconsin.
George Appel	Germany.
Oro DeG. Babcock	Michigan.
Augustus B. Bailey	Oregon.
Francis A. Ballard	Iowa.
Charles A. Banghart	Canada.
Samuel G. Barker	Wisconsin.
George T. Boon	Kansas.
Fred. C. Bradner	Indiana.
Samuel E. Burke	Michigan.
Wm. G. Burkhardt	Illinois.
George H. Bush	Wisconsin.
Albert O. Boehmer	Canada.
Reuben C. Brophy, M.D.	Illinois.
William T. Bell	Canada.
William F. Bevan	Illinois.
Aksel T. Boyesen	Minnesota.
Edward F Caldwell	Illinois.
Louis P. Cardwell	Illinois.
Russell V. Cleveland	Illinois.
John H. Conant	Wisconsin
J. H. Cunningham	Wisconsin.
F. A. Crookshank	Illinois.
Herbert J. Calkins	Wisconsin.
Charles T. Chandler	Wisconsin.
John T. Carpenter	Wisconsin.
David St I. Davies	N. Dakota.
Charles C Devereaux	Iowa.
John B. Dicus, B.S., A.B.	Illinois.
James Dodd, B.S	Illinois.
William P. Deurre	Minnesota.
William H. Dunn	Illinois.
Charles C. Dutton	Iowa.
Albert E Eberhart	Minnesota.
Timothy A. Egan	Michigan.
Jerome W. Egbert	Illinois.
George Eggers	Wisconsin.
Joseph Eggers	Wisconsin.
Charles J. Fahsel	Illinois.
John M. Falvey	Wisconsin.
Owen L. Frazee	Illinois.
John F. Fribley	Illinois.
Clyde C. Fergusson	Canada.
Edward H. Goodsell	Minnesota.
Matthew L. Gregerson	Wisconsin.
Wm. S. Griffiths, Jr	Wisconsin.
Augustus D. Groshon	Illinois.
D. J. F. Hager	Canada.
Arthur B. Howatt	California.
Frederick M. Heiden	Wisconsin.
Ashley M. Hewett	Illinois.
Fred. J. Holt	Colorado.
Robert J. Hood	Illinois.
Charles H. Hurlbut	Illinois.
George E. Huwatchek	Wisconsin.
George Hulla	Illinois.
George W Johnson	Illinois.
George V. Kohn	Wisconsin.
Othello L. Kerr	Missouri.
Carl Klein, Jr	Illinois.
Floyd C. Lander	Illinois.
C. O. Letourneau	Illinois.
John A. Locheed	Illinois.
W. H. G. Logan	Illinois.
Frank S. Lombard	Illinois.
Roderic S. Maloney	Indiana.
Benjamin F. Martin	Illinois.
Archibald McArthur	Wisconsin.
Hugh W. McMillan	Illinois.
James D. McMillan	Illinois.
George H. Madill	Canada.
Charles S. Methven	Illinois.
Cornelius J. Murphy	Illinois.
Edward J. Murray	Illinois.
Neil P. Nelson	Minnesota.
Ingvald Nesheim	Norway.
Sheldon Peck	Illinois.
George W. Pitts	Illinois.
L. G. A. Powell	Indiana.
Michael J. Prendergast	Canada.
William A. Quinn	Michigan.
Wilbert C. Reid	Michigan.
Frederick W. Rose	Canada.
Alvah I. Sargent	Illinois.
Howard L. Simmons	Illinois.
Frank L. Smith	Illinois.
Claud H. Snashall	Wisconsin.
Frank F. Snedecor	Alabama.
LeRoy Snowden	Illinois.
James H. Steele	Kansas.
Frederick W. Stephan	Ohio.
Albert B. Stiles	Illinois.
John A. Stoeckley	Indiana.
Alvin G. Sturtz	Illinois.
William L. Selsor	Illinois.
Gilbert R. Tait	Wisconsin.
James R. Talpey	California.
Mark W. Trude	Illinois.
Edward H. Varnum	Illinois.
John R. Watt	Illinois.
Frank A. Weld	Illinois.
Marshall G. Wheeler	Alabama.
Nelson B. Winter	Iowa.
Charles L. Wyeth	Ohio.

AMERICAN COLLEGE OF DENTAL SURGERY.

THE tenth annual commencement exercises of the American College of Dental Surgery were held at the Grand Opera House, Chicago, Ill., on Monday, April 6, 1896, at 2.30 P.M.

The number of matriculates for the session was four hundred and twenty.

The doctorate address was delivered by Rev. P. S. Henson, D.D., the valedictory by Thos. G. Thompson, D.D.S., and the salutatory by Charles C. Lind, D.D.S.

The degree of D.D.S. was conferred on the following graduates by Henry Wade Rogers, D.D.S., president of the university:

Will O. Asslen.
William G Andrews.
William Miller Ash.
Walter Runnells Adams.
Fred L. Axtell.
J. F. Boynton.
J. A. Birchard.
Carl S. Byrnes.
Joseph M. Bischoff.
A. T. Baxter.
George M. Berry.
F. H. Bigness.
H. A. Bear.
Jno. P. Brunton.
Charles Ellis Bartholf.
F. H. Blaschka.
James W. Birkland.
A G Bauer.
Ellis R. Boston.
Polk Huntingdon Brown.
A. B. Clark.
J. Truman Clark.
William M. Choate.
Marcus H. Cox.
W. E. Carr.
George M. Dott.
A. John Davis.
James E. Dale.
Marie Erickson.
Francis J. Freeman.
W. O. Fellman.
G. H. Frey.
W. J. Ferguson.
Arthur Paul Fillastre.
Harry J. Feltus.
James R. Goodrich.
Samuel L. Gants.
Peter Gibson.
D. C. S. Garver.
J. C. Gardiner.
L. Harrison Grove.
W. B. Graham.
Ray N. Gibbs.
L. O. Green.
Sara Conklin Gramm.
Mary Maloy Hawley.
Frederick W. Heineman.
George S Hilliard.
W. B. Hall.
E. V. Harvey.
Jacob C Hay.
I. B. Howell.
A. W. Head.
F. M. Hole.
John C. Hamill.
A. J. Hullinger.
Charles H. Jordan.
L. E James.
J. J Jackson.
Samuel Jessup.
D. J. Kuns.
Bert H. Kershaw.
C. L. Kinney.
Anna Marie Kirkeberg.
Howard Hersey Kellogg.
Herman Küchler.
C. R. Leidig.
C. Lincoln Lind.
Duchamp Charles Labbé.
Charles J. Lyons.
G. D. Libby.
H. E. Macdonald.
J. Laurence Morris.
H. H. Maynard.
Arthur J. Mears.
Ida L. Menges.
J. K. Means.
John McDermid.
Alfred D. McCabe.
F. E. McCarthy.
J. N. McDowell, B.S.
Murray Lee Ong.
M. L. Opheim, B.S.
D. W. Pratt.
Samuel Hale Potter.
A. A. Petersen, Ph.G.
A. D. Ratcliff
Francis G. Richardson.
G. H. Rolling.
J. H. Reid.
Anson F. Poley.
Frank Alexander Ross.
Earle H. Reaugh.
J. W. Smith.
Louis J. Smith.
O. E. Simpson.
P. D. Silvernail.
Charles E. Stutenroth.
Albert Stroebel.
H. H. Straith.
Wilber E. Sackett.
Edgar C. Severns.
M. V. Secrist.
H C. Spengler.
T. G. Thompson.
S. A. Turpin.
L. L. Whitson.
George E. Wasser.
S. V. Weiser.
Clem White.
Clark M. Wilson.
Louis M. Williams.
Harry Alexander Ware.
L. D. Woltzen.
G. O. Whitwam.
Arthur E. Young.
Edmund L Yard.
A. O. Yearian.
A. E. Younkin.
F. B. Young.
J. E. Zipf.
Emanuel Z. Zipperman.

WESTERN DENTAL COLLEGE OF KANSAS CITY.

THE sixth annual commencement exercises of the Western Dental College of Kansas City were held at the Auditorium, Kansas City, Mo., on Thursday evening, April 2, 1896.

The annual address was delivered by W. P. George, D.D., LL.D., the faculty address by W. F. Kuhn, A.M., M.D., and the valedictory by Thomas W. Lyell, D.D.S.

The number of matriculates for the session was two hundred and twenty.

The degree of D.D.S. was conferred on the following graduates by D. J. McMillen, M.D., D.D.S., dean of the faculty:

NAME.	STATE.	NAME.	STATE.
Herman F. Branstetter	Missouri.	William Dillingham Kirby	Kansas.
William Broadbent	Missouri.	Frank Gilkeson Lobban	Missouri.
Edwin Sever Brown	Missouri.	Thomas Walter Lyell	Missouri.
Edgar Pearson Brown	Missouri.	Francis Marion McDonald	Texas.
Clarence Manfred Burris	Iowa.	Thomas McMillen	Missouri.
Willis Victor Chapin	Kansas.	Welby Stanley Morrow	Iowa.
Christopher C. Clark	Missouri.	Joseph Shelby Mirick	Missouri.
John Logan Clark	Missouri.	Ralph Hammond McCrum	Missouri.
Russell Elmer Covey	Missouri.	Omar Preston Muckley	Ohio.
Edward Abner Dabbs	Missouri.	Orin Knisley Muckley	Ohio.
George Whitman Downing	Missouri.	John A. Parker	Missouri.
Fannie Delaney	Missouri.	John Robert Pepper	Missouri.
Albert Ulysses Edwards	Indiana.	Henry Bosworth Purl	Missouri.
Martin Frederick Ehlers	Missouri.	Harley John Riley	Missouri.
William Walter Flora	Kansas.	Noah Richard Smith	Missouri.
Theodore Green	Illinois.	Theophilus Paul Smith	Missouri.
Samuel Wilson Harris	Missouri.	John August Steinmeyer	Kansas.
Morton David Hamisfar	Missouri.	James Campbell Thompson	Missouri.
John Frank Huntling	Nebraska.	John Elias Watkins	Kansas.
Evan D. Jenkins	Kansas.	Charles Delosso Weakley	Missouri.
George Francis Kelly	Kansas.	Fred Emory Webster	Kansas.
Richard Hiram Kent	Kansas.	Linsey Leonidus Wills	Missouri.

CINCINNATI COLLEGE OF DENTAL SURGERY.

THE annual commencement exercises of the Cincinnati College of Dental Surgery were held at Sinton Hall, Cincinnati, Ohio, on Thursday evening, April 2, 1896.

Remarks were made by the dean, Professor G. S. Junkerman, M.D., D.D.S., and the valedictory address was delivered by Professor William O. Sproull.

The number of matriculates for the session was thirty-eight.

The degree of D.D S. was conferred on the following graduates by Hon. Francis B. James, LL.B., president of the board of trustees:

NAME.	STATE.	NAME.	STATE.
Jasper N. Bradford	Kentucky.	Theodore C. Gelhaar	Wisconsin.
William K. Chambers	Indiana.	Beaumont H. Kaighn	Kentucky.
Ollie D. Doran	Iowa.	Frank R. Smith	Ohio.
Aaron Grodsky	Ohio.	Leslie D. Spence	Ohio.

OHIO COLLEGE OF DENTAL SURGERY.

THE fiftieth annual commencement exercises of the Ohio College of Dental Surgery (Department of Dentistry of the University of Cincinnati) were held at the Odeon, Cincinnati, Ohio, on Tuesday evening, April 14, 1896.

The annual address was delivered by Rev. E. Trumbull Lee, D.D., and the class address by Fenimore Roudebush, D.D.S.

The number of matriculates for the session was two hundred and fifteen.

The degree of D.D.S. was conferred on the following graduates by Dr. Frank A. Hunter, president of the board of trustees :

NAME.	STATE.	NAME.	STATE.
Virgil V. Adkins	West Virginia.	Alonzo M Miller	Indiana.
Wm. A. Blackwell	Illinois.	John W. Miller	Ohio
James E. Boyd	Ohio.	Thomas M. Pearce	Kentucky.
Leon E. Boyd	Ohio.	Thomas S Phillips	Ohio.
James T. Campbell	Kentucky.	Sam Shaw Phister	Kentucky.
Lewis C. Cowden	Ohio.	John S. Recob	Ohio.
Chas. S. Dunham	Colorado.	Fred F. Rice	Ohio.
Charles V. Dye	Ohio.	Warren A. Robison	Indiana.
Reichert Erdman	Ohio.	Fenimore Roudebush	Kentucky.
William B. Forsythe	Ohio.	Lewis L. Ross	Kentucky.
Wilson Foster	Ohio.	Sallie K. Runyon	Indiana.
Frank W. Frey	Ohio.	Oscar F. Schleef	Missouri.
John C. Goreis	Ohio.	Herbert A. Schafer	Ohio
E E Hackleman	Indiana.	Milton H. Shaffer	Ohio.
Frank Harding	Indiana.	Edward C. Sherman	Ohio.
Wm. F. Heisel	Ohio.	James H. Shields	Indiana.
Sam'l D Hockman	Ohio.	Carl M. Simonson	Minnesota.
Harry S. Hopkins	Indiana.	William H. Stacy	Kentucky.
Clair M. Hulley	Ohio.	Florence E Taylor	Ohio.
Burt L. Lackey	Ohio.	Albert E. Thompson	Kentucky.
Joseph Lang	Ohio.	Arthur P Walton	Kentucky.
Arthur J Markley	Kentucky.	Leonard H. Wilson	Canada.
Karl L. Mayers	Ohio.	Theodore C. Workman	Ohio.
William B. McKee	Ohio.		

Columbian University—Dental Department.

The ninth annual commencement exercises of the Dental Department of the Columbian University were held in Metzerott Hall, Washington, D. C., on Tuesday, May 5, 1896, at 8 o'clock P.M.

The address to the graduates was delivered by Professor L. C. F. Hugo, D.D.S., and the valedictory by Joseph L. Egan, D.D.S.

The degree of D.D.S. was conferred on the following graduates by B. L. Whitman, D.D., president of the university :

NAME.	STATE.	NAME.	STATE.
R V. Barry	Dist. of Columbia.	L. J Broughton	North Carolina.
E. F. Concklin	Rhode Island.	Joseph L. Egan	Connecticut.
W. S. Hall	Alabama	Harry A. Jelly	Maryland.
L. Jordan, M.D.	Mississippi.	Hubert L. King	Dist. of Columbia.
S. C. Luckett	Texas.	John A. Moore	Indiana.
H. B. Moore	Dist. of Columbia.	J. R. Stewart	Virginia.
R E.L Wiltberger	Dist. of Columbia.	J. L. Whiteside	Maryland.

Atlanta Dental College.

The annual commencement exercises of the Atlanta Dental College were held at the Grand Opera House, Atlanta, Ga., on Thursday evening, March 26, 1896.

The valedictory was delivered by C. E. Hines, and the address to the graduating class by Dr. V. E. Turner.

The number of matriculates for the session was two hundred and two.

The degree of D.D.S. was conferred on the following graduates by Dr. J. S. Hopkins, vice-president of the board of trustees :

NAME.	STATE.
E. T. Boothe	Georgia.
C. W. Ball	Georgia.
R. W. Bragg	Virginia.
C. W. Baker	Alabama.
L. W. Burt	Georgia.
E. C. Colley	Louisiana.
Peter Colcough	Georgia.
P. M. Caillouet	Louisiana.
H. J. Cunyus	Texas.
C. V. DeLoach	Georgia.
W. R. Davis	North Carolina.
E. P. Frazier	South Carolina.
A. G. Gilder	Texas.
E. F. Gillon	Massachusetts.
H. C. Hopkins	Georgia.
C. T. Hall	Georgia.
C. A. Holyendorf	Georgia.
W. P. Hansard	Georgia.
C. E. Hines	Mississippi.
J. A. Hightower	Alabama.
R. J Kennedy	Georgia.
J. W. Kelly	South Carolina.
Edgar Jackson	Georgia.
C. C. Jordan	Georgia.
W. A. McGee	Georgia.
J. M. McGee	Georgia.
W. M. McRae	Georgia.
W. K. Meeks	Georgia.
R. M. Mason	Georgia.
J. W. Manning	Alabama.
W. B. Nichols	Mississippi.
J. D. Adeneal	Mississippi.
W. G. Sharp	Georgia.
D. A. Spence	Georgia.
J. G. Reid	Georgia.
H. M. Todd	South Carolina.
G. E West	Mississippi.
L. J. White	South Carolina.
J. T. Wester	Georgia.
D. M. Yates	Alabama.

UNIVERSITY OF BUFFALO—DENTAL DEPARTMENT.

THE fourth annual commencement exercises of the Dental Department of the University of Buffalo were held, in connection with those of the Medical and Pharmacal Departments, at Music Hall, Buffalo, N. Y., on Tuesday, May 5, 1896.

The annual address was delivered by Hon. Joseph O'Connor.

The class in dentistry were thoroughly examined before the Board of Curators of the Dental Department during the day, and were by them recommended to the council of the university for the degree of Doctor of Dental Surgery, which was accordingly conferred upon them by the chancellor.

The number of matriculates for the session was one hundred and eighty-six.

The number of graduates was thirty-six, as follows :

NAME.	STATE OR COUNTRY.
Edward W. Bridgman	New York.
Charles K Buell	New York.
C. Arthur Bean	New York.
Sidney W Bunting	Canada.
John H. Cameron	New York.
Edmund T. Comstock	New York
Horace S. Cutler	New York.
Victor A Clapp	New York.
William B Dickson	Canada.
Charles S. Decker	New York.
Carl S. Eaton	New York.
Charles E. Featherstone	Canada.
James H. Gillam	Canada.
Thomas G. Gibson	Canada.
Ralfe M. Harlan	California.
Arthur Kidder	New York.
Frank G. Lugsdin	Canada.
Herbert J. Lyle	Canada.
Emmet E. Mills	Pennsylvania.
Wilhelm E. Th. Müller	Germany.
Eugene L. Martin	New York.
Wesley A. Parish	New York.
Paul B. H Quedenfeldt	Germany.
James M. Ramie	New York.
Richard B. Redway	New York.
Carlton S. Starkweather	New York.
Peter A. Stadlinger	New York.
Henry F. Squire	New York.
Walter S Stevenson	New York.
Charles A. Stewart	New York.
Lewis P. Sanford	New York.
J. G. Van Valkenburgh	New York.
Henry D. Warren	New York.
Carl J. Woodworth	New York.
Harry C Webb	New York.
Douglas H. Young	New York.

NEW YORK COLLEGE OF DENTISTRY.

THE thirtieth annual commencement exercises of the New York College of Dentistry were held in Chickering Hall, New York City, on Thursday evening, May 14, 1896.

The address to the graduates was delivered by Professor J. W. Dowling, M.D., and the valedictory by Clark A. Heydon, Jr., D.D.S.

The number of matriculates for the session was three hundred and thirty-seven.

The degree of D.D.S. was conferred on the following graduates by F. F. Vander Veer, president of the board of trustees :

L. H. Abel.
C. M. Aden.
C. H. Allen.
C. E. Andelfinger.
T. R. Augsburg.
W. S. Barber.
J. B. Besant.
J. T. Brickell.
B. A. Burns.
R. B. Carr.
H. O. Carson.
A. L. Del Castillo.
G. R. Clark.
W. S. Currie.
Washington Dailey.
A. M. Desnoes.
L. R. Divine.
E. A Du Brul.
F. S. Downs.
T. S Dunning.
J. B. Farrell.
J. H. Finney.
C. E. Fraser, Jr.
Wilson Fitz-Randolph.
C. J. Gies.
F. H. Giesselmann.
H. F. Hammer.
E. W. Harlan.
C. F. Harreus.
Otto Herbhold.
C. A Heydon, Jr.
H. K. Howard.
W. A. Kregeloh.
M. C. Kohler.
B. G. De Laval.
F. B. Le Roy.
R. C. M. Lienau.
Adolph Lifshutz.
Leo Mandelstamm.
R. B. L. Magruder.
G W. Marshall.
Hector De Marchena.
F. H. Miller.
A. J. McCarthy.
J. M. McCormack.
G. H. Muth.
J. H. Osiatinsky.
J. G. Payne.
Sidney Phillips.
H. J. Pillion.
W. A. Sanderson.
Moritz Schlesinger.
H. C. Scobey.
H. M. Shaley
DeWitt C. Smith.
Harris Smith.
W M. Smith.
F. B. Spooner.
G. R. Stein.
W. M. Sullivan.
R. W. Sweetser.
Burton Talmage.
J. F. Thompson.
F. L. Tooley.
Charles Vetter, Jr.
Emil Vejvoda.
G. W Wakeley.
W. S. Waterbury.
R. S. Watson.
Armin Wald.
W. R. Wengorovius, Jr.
I. N. Wheeler.
W. M. Whitlock.
F. D. Wygant.

DENTAL SOCIETY ANNOUNCEMENTS.

SOUTHERN DENTAL ASSOCIATION—CHANGE IN PLACE OF MEETING.

SINCE the announcement of the meeting of the Southern Dental Association, which appeared on the third cover of the DENTAL COSMOS for May, it has been learned that the association cannot procure the necessary accommodations at the hotel on Lookout Mountain, where it was expected to hold the meeting.

The Committee of Arrangements, with the sanction of the Executive Committee and the president, has therefore decided to change the place of meeting to Asheville, N. C , where the association will convene in the ballroom of the Battery Park Hotel on Tuesday, July 28

Ample hotel accommodations at reasonable rates.

Special summer excursion rates to and from Asheville by all railroads ; also, special summer excursion rates from Asheville to Saratoga Springs, to the meeting of the American Dental Association, National Association of Dental Faculties, National Association of Dental Examiners, etc.

S. W. FOSTER, *Secretary*.

AMERICAN DENTAL SOCIETY OF EUROPE.

THE American Dental Society of Europe will hold its twenty-first meeting at Dresden, Germany, August 3, 4, and 5, 1896. All members of the profession who plan to be in Europe at that time are cordially invited to attend.

Further information can be obtained of the president, Dr. John H. Spaulding, Paris, or of WILLIAM A. SPRING, *Secretary*,
26 Christian str., Dresden.

PENNSYLVANIA STATE DENTAL EXAMINING BOARD.

THE Pennsylvania State Dental Examining Board will hold its next annual meeting at Bellefonte, Pa., July 7, 1896.

WM. E. MAGILL, *President*, Erie, Pa.
J. C. GREEN, *Secretary*, West Chester, Pa.

COLORADO STATE BOARD OF DENTAL EXAMINERS.

THE Colorado State Board of Dental Examiners will hold their next meeting June 9, 10, 11, 1896, at the office of W. E. Griswold, 401 Mack Block, Denver, Colorado. All applicants should address

D. MURRAY, *Secretary*,
421 Mack Block, Denver, Col.

WISCONSIN STATE DENTAL SOCIETY.

THE twenty-sixth annual meeting of the Wisconsin State Dental Society will be held in the Senate Chamber, Madison, Wis., July 21, 22, and 23, 1896. An exceedingly interesting program is being prepared by the Executive Committee, and a most cordial invitation is extended to all reputable practitioners in the state, who are not already members, to come if possible, and unite with us. W. H. CARSON, *Secretary*,
712 Goldsmith Bldg., Milwaukee, Wis.

INTER-STATE DENTAL ASSOCIATION.

THE joint meeting of the State Dental Associations of Iowa, Nebraska, Kansas, and Missouri, to be held at Excelsior Springs, Mo., June 23–26, promises to be one of the largest and best meetings ever held in the West. The most eminent dentists of the four states will be present and participate.

That paragon of summer hotels, "The Elms," has given us greatly reduced rates, and all railroads give one and one-third rates on certificate plan. Be sure to get receipt for amounts paid in going ; if you travel over more than one road, take a certificate from *each*. It will be impossible to get reduced rate returning without certificate.

For program or other information, address

S. C. A. RUBEY, *Secretary*,
Clinton, Mo.

NATIONAL ASSOCIATION OF DENTAL EXAMINERS.

The twelfth annual session will be held at Saratoga Springs, N. Y., on Monday, August 3, 1896, commencing at 10 o'clock A.M. and continuing from day to day during the sessions of the American Dental Association. A cordial invitation is extended to all Boards of Examiners, not at present members, to join the Association. Notice of the place of meeting will be given in the July Dental Cosmos.

Charles A. Meeker, D.D.S., *Sec'y and Treas.*,
29 Fulton st., Newark, N. J.

INDIANA STATE DENTAL ASSOCIATION.

The Indiana State Dental Association will hold its thirty-eighth annual meeting in the new Indiana Dental College Building at Indianapolis, Ind., commencing Tuesday, June 30, at 10 A.M. All members of the profession are cordially invited to attend.

The State Board of Dental Examiners meets at the same time and place.

M. A. Mason, D.D.S., *Secretary*,
Fort Wayne, Ind.

KENTUCKY STATE DENTAL ASSOCIATION.

The Kentucky State Dental Association will hold its annual meeting in Louisville, June 16 to 19, 1896. A cordial invitation is extended to members of the profession in good standing to be present.

The State Board of Dental Examiners will meet at the same time and place, for the examination of candidates and such other business as may come before it.

J. H. Baldwin, *Secretary*,
615 W. Chestnut st., Louisville, Ky.

MASSACHUSETTS BOARD OF REGISTRATION IN DENTISTRY.

A meeting of the Massachusetts Board of Registration in Dentistry for the examination of candidates will be held in Boston, Monday, June 15, 1896, at 10 A.M., at the United States Hotel.

The vacancy on the board resulting from the resignation of J. Searle Hurlbut, D D.S., of Springfield, has been filled by the appointment of Dwight M. Clapp, D.M.D., of Boston.

E. V. McLeod, *Secretary*,
New Bedford, Mass.

PENNSYLVANIA STATE DENTAL SOCIETY.

Through a misunderstanding, the announcement was made that the Pennsylvania State Dental meeting would take place on the 14th of July. It will instead take place on the 7th. Arrangements for reduced railroad rates have been made, but those desiring to avail themselves of the reduction must first secure from Dr. J. D. Thomas, 1122 Walnut st., Philada., a certificate for presentation to the ticket agent at the point of starting.

Daniel Neall McQuillen,
Chairman of Executive Committee.

EASTERN ONTARIO DENTAL ASSOCIATION.

THE seventeenth annual meeting of the Eastern Ontario Dental Association will be held at Ottawa, on June 9, 10, and 11, 1896.

GEO. H. WEAGANT, *Secretary*,
Cornwall, Ont.

EDITORIAL.

"SARTOR RESARTUS."

WE give place here to the following communication, as, owing to an accident, it reached us too late for publication under the head of Correspondence. Further, as it deals with the matter which was editorially discussed in our previous issue, we gladly accord it the prominence which it deserves :

"I desire to reply to the criticism* of the chemical part of Dr. Talbot's paper, in which the editor disclaims any intention to reflect upon the skill of the chemist, and then announces as his decision : 'The strong probability is that the methods of analysis pursued by the experts who did the work for Dr. Talbot were inaccurate. . . . We must regard the record of tests furnished by Dr. Talbot as faulty if not practically worthless.' As will be readily seen, the question resolves itself at once into the personality of the chemist Black, the chemists Salisbury and Wesener, and the chemical adjudicator, the editor.

"Now, let us consider these equations in order. Dr. Black wins admiration for himself, if more of admiration could be given him, by writing as a part of his article the following sentence : 'As I regard this as an important matter, I shall give the plans of the work in detail, so that if I have fallen into error, it may easily be detected by those skilled in this kind of investigation and corrected. . . . Though I have done considerable work in the past, for a number of years other matters so claimed my attention that this field has been neglected. To begin with, I mixed sodium urate with varying substances in order to familiarize myself anew with the murexid test.'

"It will be observed that Dr. Black does not claim to be a chemist. As to the parties of the second part, Dr. Salisbury is professor of chemistry in the Woman's Medical College of this city ; I am doing physiological and pathological chemistry exclusively every day in the year. One hundred teeth were given to Professor Salisbury without my knowledge, and one hundred teeth were given to me without his knowledge. I knew nothing of anybody's theory of uric acid. I was asked to examine these teeth for uric acid. I reported the result, and when Dr. Talbot returned from Philadelphia I found that Dr. Salisbury had made a like analysis with like results. Now for the party of the third part.

"He is in one, very clearly, defender of the faith and judge of the court of appeals. If I might make a suggestion, the following would have been a form for a clear reasoning partisan : 'Dr. Black, the ablest of our dental pathologists, says one thing and goes into details. Drs. Salisbury and Wesener, chemists unknown to me, say another thing and do not go into details.

---

* See DENTAL COSMOS for April, 1896.

I cannot decide this question without the details from Dr. Salisbury and Dr. Wesener. No detailed account was given by Dr. Talbot, as was done by Dr. Black, of the technique employed in making tests. In the absence of this, and in view of the fact that by Dr. Black's tests the urates were discovered in similar cases, we must regard,' etc.

"Further considering the verdict: 'We dismiss as valueless the reported indications of the presence of uric acid developed from the other tests used, as any chemist knows their elements of inaccuracy.'

"The reaction of No. 1 was given in every case. I called attention to its worthlessness and in my conclusion disregarded it. No. 2 and No. 3 were used in conjunction, and the findings of each were proven by the other. It is a well-recognized fact that from a medico-legal standpoint, the crystals given by No. 3 would far outweigh an interpretation of color given by No. 2. There is much less possibility if the material is sufficient; and if it is in the hands of a man who knows crystals, there is much less possibility of error in No. 3 than No. 2. As to my method of applying No. 2, the material was pulverized in a mortar. To a small quantity enough nitric acid was added to dissolve it. This was then evaporated to dryness over a water-bath. The dish was cooled. The red color usually appeared at this stage, as there was enough ammonia in the laboratory to develop the reaction.

"Each of the teeth that gave the murexid reaction gave it at this point except one. If no color appeared, a glass rod dipped in ammonia was held in the vicinity of the material, when the color was brought out by the fumes. Lastly, the rod was delicately touched to the material. The colors red, orange, yellow, and their mixtures are right difficult to differentiate unless a man is constantly working in them, especially when they appear in small pointed dots or delicate striæ.

"In conclusion, I do not know nor care anything about any man's theory of pyorrhea alveolaris. I do know that urates are found in all sorts of locations in the body, when there has been almost any kind of a preceding pathological process entirely independent of developed gout. Further, if a man has gout, I can see no reason why urates should not deposit in the mesoblastic tissue called the peridental membrane, just as it deposits in any other mesoblastic tissue.

"Finally, I opine that the next appearance of the judge will be distinctly as an advocate. J. A. WESENER, M.D.

"CHICAGO, ILL."

The point at issue is fairly stated by the critic when he says, "The question at issue resolves itself into the personality of the chemist Black, the chemists Salisbury and Wesener, and the chemical adjudicator, the editor." We presume by "personality" is meant the knowledge of how to test for uric acid and the ability to interpret the results of the test.

It is evident from the showing of Dr. Black that he possessed the requisite knowledge and ability, from the fact that he found the substance in a majority of the cases which he examined, albeit the findings astonished him. These are the facts respecting Dr. Black's research admitted by Dr. Wesener, who later classes Dr. Black as a pathologist, not a chemist, and offers as evidence of his own superior chemical ability the fact that he "is doing physiological and pathological chemistry every day in the year." Dr. Wesener takes us to task for deciding the case before all of the evidence was in,—*i.e.*, the evidence of his ability as a chemist and the details of the method by which he failed to find uric acid or urates in the same line of cases in which those substances were found by Dr. Black and have been found by several other investigators.

Perhaps our judgment may be open to some criticism in this regard, but when one man of at least fair chemical ability reports positive results and another even though claiming to have exceptional chemical ability fails to discover the same features in a similar research, the evidence of the latter is to be regarded as purely negative, and is worthy of the same consideration that all negative evidence has in the light of positive evidence to the contrary.

This view of the situation led us to the conclusion stated in our previous issue,—viz, that the methods pursued by the chemist who failed to discover uric acid or urates in the cases presented by Dr. Talbot were faulty. The evidence now submitted by one of the chemists in question furnishes the desired proof that this opinion is correct. He not only supplies the details of his method, but is careful to furnish also the assurance that he "does not know nor care anything for any man's theory of pyorrhea alveolaris."

The truth contained in the assurance quoted is evidenced by the method of analysis which he pursued, for had he had at least a speaking acquaintance with the uric-acid theory of pyorrhea alveolaris, he would have known that the uric acid or urates is regarded as the primary irritant, around which nucleus are deposited the phosphatic salts, and that the urates form but a small portion of the concretion; that possibly but a single crystal may act as the irritative agent which determines and sets up the deposit of phosphatic concretion leading by its irritative action to the phagedenic condition which we call pyorrhea alveolaris. Had he then known all this, known the possibly and probably very small amount of urates to be detected, known that they occupied but a small area in the mass of material to be examined, being also an expert chemist, he would not have distributed this small uratic crystal throughout the mass of material by first grinding the specimen to powder in a mortar before treating it with nitric acid.

Our critic being, as he himself saith, familiar with methods in physiological and pathological chemistry, knows of course that the normal yellow tint of the xanthoproteic reaction may be modified in making the murexid test so that it will be manifested as various shades of orange merging into red according to the amount of urates present and the uniformity with which he has distributed these same urates throughout the mass by faithful grinding of the specimen. It is possibly a knowledge of this which leads our critic to remark, "The colors red, orange, yellow, and their mixtures, are right difficult to differentiate unless a man is constantly working in them." But any tyro with normal vision can differentiate a bright purple red spot on a lemon yellow field ; and the murexid reaction can be obtained this way in the line of cases under consideration, provided one does not blend the color-forming materials by first grinding them together in a mortar, after the manner of an expert chemist who knows nothing of the uric-acid theory of pyorrhea alveolaris, before making the test. A dental pathologist with a fair knowledge of chemistry knows better, and consequently if you want to find uric acid in serumal deposits,—Well, the inference is obvious.

SKIAGRAPHY IN DENTISTRY.

THE announcement by Professor Roentgen of his now famous discovery of a method for recording upon a sensitized plate 'the action of radiant energy, has given to the world a new means of investigation which is already bringing forth fruit in the way of practical results. So rapidly is the improvement in these results taking place, that the work of a week ago has value only as a historical record of the steps by which greater achievements have been made.

The practical value of the X ray as a diagnostic means in general surgery and pathology became at once apparent when it was found that the bony structure of the hand could be recorded upon a sensitized plate by means of it. Its use for locating foreign bodies and in studying fractures of the bones is now clearly established as a practical method in surgical diagnosis.

The importance and value of this method as applied to dentistry it would be difficult to estimate. We present in this issue a number of half-tone reproductions of an interesting series of skiagraphs made by Professor Wm. James Morton, which are printed in connection with his address on the subject before a recent meeting of the New York Odontological Society. It is claimed most justly by Professor Morton that any attempt at reproduction of the pictures is attended with loss of detail, that the highest perfection of the picture is to be found only in the negative. This we can fully substantiate, for notwithstanding the fact that our illustrations represent the best that can be at present achieved by the half-tone process, there is some unavoidable loss of detail as compared with the original negatives. They are, however, sufficiently clear to show what can be accomplished in the present stage of the art, and it is evident that for the diagnosis of impacted or unerupted teeth, locating the position of broken instruments in canals, detecting the projection of portions of fillings beyond the apical foramen, the diagnosis of inflammatory lesions in the jaws, necrotic bone, etc., there is a wide field of utility in dentistry for the X ray.

A HALF-CENTURY MARK IN DENTAL EDUCATION.

THE semi-centennial anniversary of the Ohio College of Dental Surgery was appropriately celebrated at Cincinnati, Ohio, April 16, 1896, by memorial exercises and the erection of a tablet by the alumni in honor of the founder, Dr. James Taylor. Too much praise cannot be given the pioneers in the regions of dental professional education, which in its literature and teaching institutions has won for this country a foremost rank in the domain of dental culture. Every dentist is to-day a debtor to Harris, Taylor, and the other founders and promoters of the original colleges for dental instruction. It is in recognition of this obligation that we direct attention and accord space to the memorial address of Professor Cassidy.

OBITUARY.

JAMES TAYLOR, M.D., D.D.S.

BY J. S. CASSIDY, M.D., D.D.S., COVINGTON, KY.

(Memorial Address, Fiftieth Anniversary of the Ohio College of Dental Surgery.)

THE recollection by those who knew Dr. James Taylor most intimately, of the charmingly honest qualities of his nature, has not been dimmed by the intervening years since he was in our midst; those qualities of heart and mind so evident that the stranger's confidence was won at once, and retained during increasing years of friendship.

Long before I had the pleasure of knowing him personally, I had heard him spoken of with love and affection by many of the oldest and best people of that time; a fact to which might be attributed largely some oftentimes expressed opinions of my own on the relatively high standing in the professional and social world of those necessarily itinerant dental practitioners contemporaneous with him.

It is, however, of Dr. Taylor as the originator, the Nestor of dental education in all this region of our country west of the Alleghenies, I wish to speak, as the man to whom the exclusive honor is due of establishing and maintaining the Ohio College of Dental Surgery, under difficulties of which many of us here can have no conception.

As he himself has said, "there were times when discouragement and failure seemed to be the inevitable consequences" of his unselfish efforts. But the spirit of wisdom was upon him, and he continued to labor in the cause, for a grand and noble purpose, until success was assured: in proof of which we are gathered here to-day to offer to his memory the meed of praise, our gratitude and our love.

After several years of service as dean of this college he resigned his onerous charge to other hands, but still kept in touch with the classes by occasional lectures, and as a member of the board of trustees; and when in his comparatively old age circumstances over which he had no control disrupted the faculty, he assumed the task of changing chaos into order, and almost despair into the brightest hope; for without him at that time these happy changes in the condition of affairs would probably not have been accomplished.

'Twas then that we younger members of the faculty learned to know him well. His optimistic views in regard to the immediate future of the institution permeated its very atmosphere, and encouraged us, impelled us, to renewed exertion. He had said more than once that he hoped and expected to live to see the day when one hundred students would be in attendance,—a statement that seemed to us almost preposterous, for in those days young men were not disposed to enter the profession through the doors of even the few dental colleges then existing; but he was wiser than we thought, for were he living now he would see enrolled more than double the number of his prophecy.

Truly the enthusiasm with which he labored overmastered the passage of time; and although the leaves in his chaplet were mellowed, aye, seared, by the years that had gone, there hovered around him, and abided with him always, the nimbus of eternal youth. Is it any wonder that his colaborers were imbued with some of the ardor of his own sanguine personality?

Another characteristic in his nature was his unvarying kindness to students; and while strict in his demands that they should do their duty during his course of lectures, the per cent. that he gave them in the final consultation by the faculty bore heavily in the scale on the side of mercy.

His abilities as a teacher did not depend alone upon his superior mental endowments; he had systematic method, as well as intellect, to aid him in imparting the knowledge with which his mind was so abundantly stored. He was not in the narrow sense dogmatic, for in his lectures he quoted copiously from other authorities; but the students were never left in doubt as to the correct practice in a given case, or the probable truth or falsity of any theory involved in the subject under consideration.

In his intercourse with his colleagues, officially or otherwise, he always manifested the kindly character of the Christian gentleman; considerate for the feelings of others, his gentle disposition won all hearts. Amiability, friendship, and love were his instinctive possessions. He enjoyed a mild joke, and wit and humor, yet words never passed his lips, nor stories told in his presence, that a woman might not hear.

What more can I say?

The dream of his life is realized; the edifice of dental education, of which he was one of the two architects, is nearly completed. May peace be with him! The ages yet to come will produce many noble men, none, however, nobler than he.

Thou shalt continue to garner thy sheaves, O Death! but few will be the germs of pre-eminent manhood in thy harvest of golden grain, that will excel, in all that the word implies, the honored subject of this memorial.

DR. PHINEAS G. C. HUNT.

DIED, in Indianapolis, Ind., April 24, 1896, of heart-trouble, PHINEAS GEORGE CANNING HUNT, D.D.S., in the sixty-ninth year of his age.

Dr. Hunt's death removes another eminent Western dentist. He was born in Champaign county, Ohio, in 1827. On the death of his father, in 1833, his mother moved with her children to Indiana, where he attended school near Richmond in winter and was generally engaged in summer in farm labor. Thus was passed much of his youth and school days until he attained an age when he realized the necessity of selecting some life occupation. He had an elder brother, David P. Hunt, who was then practicing dentistry in Indianapolis, and under whom he became a student in 1846. Two years later his brother died, and Dr. Hunt found the weight of a full practice suddenly placed upon him at the age of twenty-one. His practice from that period to within a few months of his death was one of progress and steadily increasing success. In his early practice he fashioned his own instruments, and was the inventor of many helping devices. He is credited by Richardson with the first introduction to the dental profession of the process of attaching porcelain teeth to a metallic base with rubber or celluloid. He was also one of the first to exemplify replantation, and to demonstrate that teeth could be extracted and with proper treatment replaced for useful service

In 1858, Dr. Hunt took an active part in the organization of the Indiana State Dental Association, and was one of its first vice-presidents. He was also elected president of that association in 1861, and again in 1871 The first law to regulate the practice of dentistry in Indiana was passed at the legislative session of 1878–79, and provided for a board of five examiners, to be elected by the State Dental Association. Dr. Hunt was made president of the board of examiners on its organization, and held that position continuously for many years.

When the preliminary meeting was held at Niagara Falls in 1859 for the purpose of organizing the American Dental Association, Dr. Hunt was a member of that body He was also present at the permanent organization of the association at Washington in 1860, and was a member up to the time of his decease. He served it faithfully in committee work and in official capacities He was made its president in 1872.

In 1870, the Ohio College of Dental Surgery conferred on Dr. Hunt the degree of Doctor of Dental Surgery, the Indiana Medical College having already similarly honored him with the medical degree in 1869. He took an active interest in the establishment of the Indiana Dental College in 1879. He was one of the original trustees of that school, and president of it at the time of his death. In 1890 he was made professor of crown and bridge and porcelain work in that institution. In addition to all this, Dr Hunt was a writer of no mean ability, and in his earlier days of practice was a frequent contributor to the literature of his profession.

For upward of twenty years Dr. Hunt had been greatly interested in Florida, where he owned three orange groves. On one of these he generally spent his winters He returned from Florida only a little over a month before his death.

As an operator Dr. Hunt ranked among the best in the country. He was energetic, active, and progressive, and a recognized leader among the profession in Indiana. Several dentists who are now prominent in the profession in the West first studied under him. He was a prominent Mason, and a member of the Theosophical Society of Indianapolis.

Dr. Hunt married Hannah Mary Phipps, who died in February, 1892. He leaves four children,—three daughters and one son, Dr. George E. Hunt, now professor of materia medica and oral pathology in the Indiana Dental College.

RICHARD S. WILLIAMS.

DIED, in New York City, April 15, 1896, of Bright's disease and heart-failure, RICHARD S. WILLIAMS, in the fifty-sixth year of his age.

Mr. Williams has been long and favorably known to the dental profession as a dealer in dental supplies. His specialty was the manufacture of gold foil cylinders, pellets, blocks, etc. He was born at Hempstead, Long Island, April 4, 1841. Having taken a preliminary course at the seminary at Amenia, N. Y., he entered Wesleyan University, and was graduated from that institution about 1864. He soon after entered the dental supply business with the late Mr. Johnston, under the firm name of M. M. Johnston & Co. In 1866 Mr. Williams withdrew from the firm and started business for himself, giving his special attention to the manufacture of gold foils, which have been much appreciated among the dental profession for their excellence.

In January, 1881, Mr. Williams was married to Miss Mary E. Abel, of Brooklyn, N. Y., who survives him. His decease is very much regretted among a large circle.

◆

HINTS, QUERIES, AND COMMENTS.

A SHORT time ago, when using cataphoresis for obtunding sensitive dentine, I had a rather unpleasant experience ; and I give it here as a caution, that others may not have a like experience.

I was preparing a buccal cavity in the right inferior second molar, which was extremely sensitive. The patient, a lady, held the electrode in her left hand. I was not able to use above fifteen volts. After applying it for fifteen minutes, the cavity still sensitive, I continued the application ten minutes longer, and was then able to excavate without causing any pain. After the operation, the patient remarked she was having a severe pain in her finger, and removed her wedding ring. To her surprise and my mortification, there was quite a blister on the back of the finger. She said she felt a slight burning sensation under the ring all the time during the application, but did not think it necessary to call my attention to it.

Since using this method, this is the longest time required for the application. Possibly the action under the ring retarded the action in the tooth. I am now careful to see that there are no rings on the hand in which the electrode is held.—GEO. A. MAXFIELD, D.D.S., Holyoke, Mass.

DR. DAVID (*Journal de Pharmacie et de Chimie*) gives the following as the composition of modeling or impression compound :

Stearin, 25 grams ;
Copal, semi-soft, 25 grams :
Talcum, powdered, 50 grams ;
Carmine (coloring) 0.5 gram ;
Oil Rose Geranium, 6 drops.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

The abbreviations of titles used are those common to bibliographical work, and will, it is presumed, be readily comprehended by any one familiar with dental or scientific publications. Any explanation will be gladly furnished by the compiler. A star (*) indicates a Thesis.

Catching (B. H.) Compendium of practical dentistry for 1895. Atlanta, Ga., 1896, B. H. Catching, 318 p. 8°.

Leche (Wilhelm.) Zur Entwicklungsgeschichte des Zahnsystems der Säugethiere, zu gleich ein Beitrag zur Stammesgeschichte dieser Tiergruppe. 1. Th. Ontogenie. Stuttgart, 1895, E. Nägele. 8°.

Mitchell (Clifford.) Dental chemistry and metallurgy. 4. ed., revised, enlarged, etc. Chicago, 1896, W. T. Keener Co., 586 p. 8°.

Schmidt (M. B.) Ueber die Flimmencysten der Zungenwurzel und die drüsigen Anhänge des Ductus thyreoglossus. Jena, 1896, G. Fischer. 8°.

Siegel. Die Mundseuche. Berlin, 1895, A. Hirschwald, 29 p., 1 pl. 8°.

Allan (G. S.) The contour filling: a study. Dental Cosmos, Phila., 1896, xxxviii, 321–327. [Discussion], 342–344. —**Alleged** (The) murder by a Liverpool dentist: acquittal. Lancet, Lond., 1896, i, 860.—**Ambler** (H. L.) Cataphoresis for obtunding sensitive dentine. Ohio Dent. J., Toledo, 1896, xvi, 169–176.—**Andrews** (R. R.) Evidences of pre-historic dentistry in Central America. Tr. Pan.-Am. M. Cong. 1893, Wash., 1895, pt. ii, 1873–1877.—**Asay** (J. L.) Electrical action between metal fillings. Brit. J. Dent. Sc., Lond., 1896, xxxix, 275.—**Ashton** (E. L.) Hemorrhage: an interesting case in practice. Ohio Dent. J., Toledo, 1896, xvi, 177.—**Augiéras.** Empyème de l'antre d'Highmore consécutif à la déviation de la cloison. Rev. internat. de rhinol. [etc.], Par., 1896, vi, 59.—**Ballowitz** (E.) Systematik der Kronen- und Brückenarbeiten. Deutsche Monatschr. f. Zahnh., Leipz., 1896, xiv, 57–79.—**Barclay** (W.) The surgical treatment of tic douloureux. Bristol M.-Chir. J., 1896, xiv, 53–67.—**Barthélemy.** Leucoplasie buccale. Ann. de dermat. et syph., Par., 1896, vii, 356.—**Battle** (W. H.) A case of extreme stenosis of lower part of pharynx (syphilitic). Tr. Clin. Soc. Lond., 1894–5, xxviii, 305–307. —**Benicio** (A.) Breve noticia sobre a arte do dentista no Brazil. Tr. Pan.-Am. M. Cong. 1893, Wash., 1895, pt. ii, 1900–1905.—**Bentley** (C. E.) To what extent is internal medication a necessity in the practice of dentistry? Dental Rev., Chicago, 1896, x, 239–245. [Discussion], 267–279.—**Berger.** Tumeurs mixtes des glandes du voile du palais. Rev. prat. d. trav. de méd., Par., 1896, liii, 97. —**Black** (G. V.) Practical utility of accurate studies of the physical properties of the teeth and of filling-materials. Dental Cosmos, Phila., 1896, xxxviii, 296–310. [Discussion], 333–341.—**Bogue** (E. A.) Principles underlying the regulation of the human teeth. Tr. Pan.-Am. M. Cong. 1893, Wash., 1895, pt. ii, 1878–1881.—**Bouyer** (A.) La pharyngo-laryngite et son traitement par les eaux de Cauterets. Gaz. hebd. d. sc. méd. de Bordeaux, 1896, xvii, 160–163.—**Brower** (E. D.) Abscess of the antrum. Ohio Dent. J., Toledo, 1896, xvi, 189–192.—**Brown** (P.) Suggestions on the use of electrical osmosis in dental practice. Internat. Dent. J., Phila., 1896, xvii, 197–203.—**Buisseret** (A.) De l'allaitement prolongé comme cause de déviations dentaires. Clinique, Brux., 1896, x, 186–189.—**Burt.** Observation d'un cas d'accident d'évolution de la dent de sagesse. Rev. odont., Par., 1896, xvii, 103.—**Buxton** (D.) The nature of anaesthesia: an appended note. Brit. J. Dent. Sc., Lond., 1896, xxxix, 241–256.—**Campbell** (J. T.) Pharyngo-mycosis leptothrica. Med. News, N. Y., 1896, lxviii, 371–373.—**Carruthers** (W. S.) Dentition in children. Univ. med., Galveston, 1895–6, i, 151–157.—**Cassel.** Tic douloureux de la face; résection en une seule opération des deux nerfs maxillaires supérieur et inférieur. Echo méd., Toulouse, 1896, 2. s., x, 126–129.—**Clark** (B. F. R.) Hypertrophy of the lingual tonsil, with report of seven cases. Phila. Polyclin., 1896, v, 123–126.—**Conor** (J. O.) Note on excision of the tongue for cancerous disease. Med. Press & Circ., Lond., 1896, cxii, 396.—**Deaths** under chloroform. Brit. J. Dent. Sc., Lond., 1896, xxxix, 286–288.—**Dents** (Les) de lait: utilité de leur conservation jusqu' à leur chute physiologique. Rev. odont., Par., 1896, xvii, 125-134.—**Dentz.** An anomaly of the first upper temporary incisor and its morphological significance. Brit. J. Dent. Sc., Lond., 1896, xxxix, 279-283.—**Dumontpallier.** Traitement de certaines tumeurs de la bouche au moyen du chlorate de potasse. Bull. Acad. de méd., Par., 1896, 3. s., xxxv, 236-244.—**Dwinelle** (William H.) [1819-96.] (Obituary.) Internat. Dent. J., Phila., 1896, xvii, 256-258.—**Edwards** (L. A.) The artistic in crown and bridge work. Dental Rev., Chicago, 1896, x, 245-248. [Discussion], 279-292.—**Emery & Sabouraud.** Chancre mon de la langue. Ann. de dermat. et syph., Par., 1896, 3. s., viii, 198-201.—**Evans** (G.) Pulpless teeth and their treatment. Tr. Pan.-Am. M. Cong. 1893, Wash., 1895, pt. ii, 1858-1867.—**Faisst** (O.) Ueber Totalnekrose des Unterkiefers nach Osteomyelitis. Beitr. z. klin. Chir., Tübingen, 1895-6, xv, 750-756.—**Feliciani** (I.) Dermatosi sul de corso del nervo trigemino. Gazz. med. di Roma, 1896, xxii, 169-182.—**Fenthol** (O.) Ueber Solilagold. Deutsche Monatschr. f. Zahnh., Leipz., 1896, xiv, 137-140.—**Fischer** (H. F.) Pseudochorea due to hypertrophy of Luschka's tonsil. Homœop. Eye, Ear & Throat J., N. Y., 1895, i, 371-373.—**Fletcher** (M. H.) Oral and dental surgery; address of the President of the section. Tr. Pan.-Am. M. Cong. 1893, Wash., 1895, pt. ii, 1853-1857.—**Fox** (Charles James.) [1829-96.] (Obituary.) Brit. J. Dent. Sc., Lond., 1896, xxxix, 322.—**Francis** (C. E.) Hygiene of the mouth. Tr. Pan.-Am. M. Cong. 1893, Wash., 1895, pt. ii, 1881-1883. —**von Frankl-Hochwart** (L.) Ueber Zahnextraction und Facialislähmung. Wien. klin. Rundsch., 1896, x, 145-147.—**French** (H. C.) Perforation of the soft palate. Homœop. Eye, Ear & Throat J., N. Y., 1895, i, 65.—**Friedrichs** (A. G.) The necessity for the early recognition of morbid growths in the mouth. N. Orl. M. & S. J., 1895-6, n. s., xxiii, 524-529.—Functional aphonia in man; treatment, etc., with special reference to so called varicose veins at the base of the tongue. Lancet, Lond., 1896, i, 512; 581; 653; 735; 802; 885.—**Givel** (A.) Tumeur congénitale de la gencive. Rev. méd. de la Suisse Rom., Génève, 1896, xvi, 153-155.—**Goslee** (H. J.) A few thoughts on the essentials of soldering. Dental Rev., Chicago, 1896, x, 248-257.—**Grant** (H. H.) Sarcoma of the lower jaw. N. York M. Reporter, Rochester, 1896, iii, 156-158.—**Grósz** (G.) [Pathology of aphthæ neonatorum; its prophylaxis and therapeutics.] Orvosi hetil., Budapest, 1896, xl, 85; 100; 127.—**Henriquez** (J. M.) De la importancia de un tratamiento oportuno del abceso alveolar. An. d. Circ. méd. argent., Buenos Aires, 1895, xviii, 288-291.—**Heath.** Honeycombed and syphilitic teeth. Dental Rec., Lond., 1896, xvi, 107-113.—**Hoehl** (E.) Beitrag zur Histologie der Pulpa und des Dentins. Arch. f. Anat. u. Entwcklngsgesch., Leipz., 1896, 31-54, 1 pl. —**Ingals** (E. F.) Abscess of the antrum of Highmore. Chicago Clin. Rev., 1895-6, v, 399-402.—**Jackman** (W. T.) Dental education. Ohio Dent. J., Toledo, 1896, xvi, 193-197.—**Jervell** (K.) Fire Tilfælde af Aktinomykose, udgaaende fra Mundhulen. [Four cases of actinomycosis originating in the mouth.] Festskr. . . . Prof Heibergs [etc.], Kristiania, 1895, 100-112.—**Johnson** (R.) Some unusual cases of swelling of the parotid gland. Lancet, Lond., 1896, i, 1056-1058.—**Jullien** (L.) Un cas de leucoplasie linguale. Ann. de dermat. et syph., Par., 1896, 3. s., viii, 201-204.—**Kolaczek.** Zur Narkosenfrage. Deutsche med. Wchnschr., Leipz. u. Berl., 1896, xxii, 179.—**Küttner** (H.) Ueber entzündliche Tumoren der Submaxillar-Speicheldrüse. Beitr. z. klin. Chir., Tübingen, 1895-6, xv, 815-828.—**Langlois** (P.) & **Maurange** (G.) Contribution à l'étude des anesthésies mixtes: spartéine, morphine et chloroforme. Arch. de pharmacodyn., Gand & Par., 1895-6, ii, 209-233.—**Latham** (V. A.) Dental medication and experiments with cases. Tr. Pan.-Am. M. Cong. 1893, Wash., 1895, pt. ii, 1893-1900. ——— The value of differential diagnosis in dentistry. J. Am. M. Ass., Chicago, 1896, xxvi, 722-725.—**Lavrand** (H.) Angine streptococcique suivie de paralysie du voile du palais. J. d. sc. méd. de Lille, 1896, i, 305-308. ——— Paralysie de la moitié gauche du voile du palais. *Ibid:* 277-279.—**Lydston** (G. F.) The relation of syphilis to dentistry. Tr. Pan.-Am. M. Cong. 1893, Wash., 1895, pt. ii, 1890-1893.—**Mackenzie** (J. N.) Aspergillus mycosis of the maxillary antrum. *Ibid:* 1568-1670.—**Martin** (A.) Du pain dentaire complet. Progrès dent., Par., 1896, xxiii, 60.—**Mears** (J. E.) Injuries and diseases of the mouth, tongue, fauces, palate, and jaws. Internat. Encycl. Surg. (Ashhurst), N. Y., 1895, vii, 743-749.—**Merrick** (S. K.) Hypertrophy of the pharyngeal tonsil. Charlotte [N. C.] M. J., 1896, viii, 467-469.—**Metcalf** (F. H.) Longevity. Am. J. Dent. Sc., Balt., 1896, 3. s., xxix, 546-554.—**Minnich** (C. S.) A case of gangrene of the mouth. N. Albany M. Herald, 1896, xvi, 63.—**Mislawsky** (N. A.) & **Smirnow** (A. E.) Weitere Untersuchungen über die Speichelsecretion. Arch. f. Physiol., Leipz., 1896, 93-104, 1 pl.—**Monaco** (G.) Tonsilotomia galvano cáustica. An. d. Circ. méd. argent., Buenos Aires, 1895, xviii, 353.—**Morrison** (W. J.) Facial neuralgia superinduced by dental irritation, with specimens. South. Pract., Nashville, 1896, xviii, 105-107.—**Morton** (T. S. K.) Excision of lower jaw for sarcoma. Ann. Surg., Phila., 1896, xxiii, 491.—**Morton** (W. J.) Guaiacocain cataphoresis and local anesthesia; outfit and technique. Dental Cosmos, Phila., 1896, xxxviii, 328-331.—**Newman** (D.) Two cases of malignant disease of the tonsil treated by operation, and well more than four years thereafter. Glasgow M. J , 1896, xlv, 273-277.—**North** (B.) Teeth and their relation to speech. Brit. J. Dent. Sc., Lond., 1896, xxxix, 289-294.—**Opening** of the New Dental Hospital of Ireland. Dental Rec., Lond., 1896, xvi, 134-140.—**Palmer** (S. B.) Oral electricity and vital currents. Internat. Dent. J., Phila., 1896, xvii, 215-219.—**Posadas** (A.) Contributo al estudio de los tumores de la bóveda palatina. An. d. Circ. méd. argent., Buenos Aires, 1895, xviii, 3; 77, 1 pl.—**Proposed** Maryland dental law. Am. J. Dent. Sc., Balt., 1896, 3. s., xxix, 568-570.—**Quinlan** (F. J.) A case of prolonged deafness (six years) due to enlarged tonsils; excision; cure. N. York Eye & Ear Infirm. Rep., 1896, iv, 96-98.—**Renon.** L'amygdalite fistuleuse. Rev. gén. de clin. et thérap., Par., 1896, x, 213.—**Richardson** (Sir B. W.) On the next great advance in anæsthesia; including a new exposition of common sensibility. Lancet, Lond., 1896, i, 1047-1051.—**Roberts** (J. B.) A case of papilloma of the tonsil; removal. Arch. Otol., N. Y., 1896, xxv, 55-57. ——— Injuries and diseases of the face, cheeks and lips. Internat. Encycl. Surg. (Ashhurst), N. Y., 1895, vii, 727-742.—**Rosenfeld** (M.) Ueber die Chloroformnarkose bei bestimmten Gehalt der Inspirationsluft an Chloroformdämpfen. Arch. f. exper. Path. u. Pharmakol., Leipz., 1895-6, xxxviii, 52-59.—**Rosenthal** (C. H.) New treatment for pyorrhœa alveolaris. Dental Reg., Cincin., 1896, l, 165.—**Royce** (E. A.) Gold beating. Dental Rev., Chicago, 1896, x, 257-262.—**Sappey** (Constant.) [1810-96.] (Nécrologie.) Rev. odont., Par., 1896, xvii, 98.—**Scheppegrell** (W.) Papillomata of the soft palate. N. York M. J., 1896, lxiii, 470.—**Schmid** (H.) Ueber einige neuere Zahnextractionsinstrumente nebst Bemerkungen über schwierige Zahnextractionen. Prag. med. Wchnschr., 1896, xxi, 22; 40; 71; 106; 116; 150.—**Semon** (F.) A novel form of malingering; chronic self-inflicted ulceration of the throat. Tr. Clin. Soc. Lond., 1894-5, xxviii, 108-110.—**Sewill** (H.) Death under chloroform at a dentist's rooms. Lancet, Lond., 1896, i, 889.—**Shurly** (E. L.) Preliminary note on the use of the formates in ulceration of the pharyngeal and laryngeal mucous membrane. Tr. Pan.-Am. M. Cong. 1893, Wash., 1895, pt. ii, 1580-1588.—**Solis-Cohen** (S.) Some of the throat conditions observed in gouty subjects. *Ibid:* 1535-1540.—**Soffiantini** (G.) Anatomia della glandola sottomascellare in relazione alle applicazioni chirurgiche. Gazz. med. lomb., Milano, 1896, lv, 51-53.—**Southam.** A case of excision of one half of the tongue. Clin. Sketches, Lond., 1896, iii, 67.—**Storey** (J. C.) First dentition, or teething babies, with some of the ills incident thereto. Texas Dent. J., Dallas, 1896, xvi, 31-36. ——— Some thoughts touching excess of mineral or calcareous matter in the system. Am. J. Dent. Sc., Balt., 1896, 3. s., xxix, 540-546 ——— The treatment of pulpless teeth. Brit. J. Dent. Sc., Lond., 1896, xxxix, 301-306.—**Talbot** (E. S.) Development of the vault: history of deformed vaults. Tr. Pan.-Am. M. Cong. 1893, Wash., 1895, pt. ii, 1884-1890. ——— Pyorrhea alveolaris. Dental Cosmos, Phila., 1896, xxxviii, 310-321. [Discussion], 344-352. ——— *Also:* Internat. Dent. J., Phila., 1896, xvii, 203-215, 1 pl. —**Thiesing.** Ueber Aethylchlorid und Wilson's Localanästheticum. Deutsche Monatschr. f. Zahnh., Leipz., 1896, xiv, 140-146.—**Vehslage** (S. H.) Inspection of the mouth. Homœop. Eye, Ear & Throat J., N. Y., 1895, i, 168-170.—**Waller** (A. D.) The action of anæsthetics on isolated nerve. Dental Rec., Lond., 1896, xvi, 141-143.—**White** (John De Haven.) [1815-96.] (Obituary.) Dental Cosmos, Phila., 1896, xxxviii, 363.—**Wolffberg.** Ein Fall von Tod in der Chloroform-Narkose. Aerztl. Sachverst. Ztg., Berl., 1895, i, 253-257.—**Zoege von Manteuffel** (W.) Die üblen Zufälle bei und nach Chloroform- und Aether-Narkosen. München Med- Wchnschr., 1896, xliii, 265-269.

◆

LIST OF UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING APRIL, 1896.

April 7.—No. 557,654, to H. V. des Portes. Artificial tooth.
" " No. 557,664, to V. W. Gilbert. Speculum.
" " No. 557,846, to William B. Mann. Elevating chair.
" " No. 557,847, to William B. Mann. Dental chair.
" *14.*—No. 558,133, to James B. Wells. Artificial tooth-crown.
" " No. 558,152, to Arthur W. Browne. Dental engine.
" " No. 558,153, to Arthur W. Browne. Electric dental plugger.
" " No. 558,443, to Ormond E. Wall. Dental plugger.
" *21.*—No. 558,772, to Arthur W. Browne. Dental engine.
" *28.*—No. 559,185, to Walter L. Mason. Porcelain crown.

THE

DENTAL COSMOS.

VOL. XXXVIII. PHILADELPHIA, JULY, 1896. No. 7.

ORIGINAL COMMUNICATIONS.

MISTAKES.

BY SAFFORD G. PERRY, D.D.S., NEW YORK, N. Y.

(Read before the New York Odontological Society, April 21, 1896.)

THIS paper is intended more particularly for the young; but are we not all young? It was a mistake to promise, in a thoughtless moment, to write it for this society. When published it will be a mistake to expect it to be generally read.

You have doubtless before now written out some important truth, and found six months after that your neighbor, who takes all the journals, never heard of it! It probably weighed an ounce; you made the mistake of thinking it weighed a ton!

It is a mistake to pose as a self-appointed censor; yet every other man you meet will tell you what you ought and what you ought not to do.

With the unconscious assurance of a Grecian philosopher, he will tell you that this or that is a mistake, and if you are in the habit of letting somebody else do your thinking, you may believe he tells the truth.

So ingrained is the habit of sitting in judgment on other people's affairs that every man must submit to the ordeal of being sat on, and his life may be likened to a long trial by jury, with his neighbors in the jury-box. And the chances are their verdict will not always be free from the narrow-mindedness sure to be found in every neighborhood.

Following in line with this universal habit of telling people what they ought to do, we will join in the procession of censors, and point out some of the mistakes often made in our profession.

It will be a thankless task, for it implies giving advice, and that is something very few people are willing to take. They will take a dollar's worth of almost anything you choose to give them, but offer them a hundred dollars' worth of advice, and they will say "thanks," which means they don't want it.

If given to the young, they refuse it because they think they are old; if offered to the old, they think because they are not young they don't need it.

It is a mistake to try to hide your mistakes. Own up to them like little men, and profit by them, and tell of them, that others may profit by them.

It is a mistake to brag about what you know. To bolster up your knowledge by talking about it may give the impression that you are not quite certain of it yourself. One of Dr. Dwinelle's deacon friends used to say, "It is astonishing what we don't know!" If you would babble about your ignorance as you do about your knowledge, like the brook, you might "run on forever."

If ignorance is bliss, what folly it is to try to appear wise! But if you are wise and can't help it, wear your wisdom gracefully, as a garment nature made for you, and one, therefore, that fits and can never be out of fashion.

Life itself may be a mistake if taken too seriously, too flippantly, or with a wry face, as if it were a pill. But if it is a mistake, like doctor's stuff, it must be taken, willy nilly! But your mistakes should be "stepping stones to something higher," and should be used in building a solid stairway to the unassailable heights of knowledge. Not even your castles in Spain have the fascination of such cloud-capped towers, from which, in undisturbed composure, you can overlook the world.

"Procrastination is the thief of time." It is a mistake to be late for a train—or a patient. In either case you are liable to be left: by the train at once, and by the patient later, if you persist in the bad habit. A brother, whom you all know, has this unconscious habit; his patients understand it, and those who still stick to him, in spite of his besetting sin, go to him a half-hour late. Yet he is such a good fellow that if you knew his name you would beg him to continue the habit and die late!

It is a mistake to potter. Down East they call it "putter." Life is short, and every moment counts. Work is the emblem of the age, and every stroke should tell. William said, "If it were done when 'tis done, it were well it were done quickly." What he said still "goes." (It is not intended that this shall conflict with a section of the by-laws, to come later, on the subject of moderation in work.)

Make hay while the sun shines, because the light is good. Make love while the moon shines, because the light is bad. Time then is not worth ten dollars per hour—though some may think so.

It is a mistake to talk too much. Keep your patient's mouth open and your own shut.

The value of talk generally decreases in the inverse ratio of the square of its quantity. This is an arithmetical and proverbial proposition that jibes with the admonition of Scripture in reference to the unbridled use of tongues.

The question of the origin of the universe and the natural tendency of things is one to be discussed after dinner over a mouthful of tea, and not while you have your working clothes on over a mouthful of teeth.

During office hours it is a mistake to split theological, philosophical, or scientific hairs. You may get careless and split the root! While exposing the fallacy of your victim's argument you may get excited and expose the pulp! Possibly, too, you may expose your own ignorance.

It is a mistake to attempt to reform the world. If you feel that you must make the effort, put it off till next week. By that time it may come to an end, and you will be saved the trouble.

It is a mistake to go through this vale of tears with a long face. It deepens the gloom. Because you have an earnest purpose in life it is not necessary to look as if you had just come from a funeral. Shakespeare puts some of his wisest sayings into the mouths of his court jesters. One of them said, "Prithee, good masters, I am serious in my fooling!" In your moments of exuberation it is not your fault if your friends have not the wit to read between the lines.

It is a mistake to have the big head. Your patients may find it out and talk about it. If you can have it and keep it a secret, it may be permissible, because it makes you feel good. It is doubtful, however, if a case was ever known where the fact did not leak out.

It is a mistake to consider yourself opaque. The world is full of mind-readers and clairvoyants, and they can see through you as though a pane of glass.

They can see the clockwork in your brain, and by watching the wheels and cogs can tell exactly when you are going to spring your hobby on them!

They know exactly when you are going to advocate brown bread for the teeth, as if good teeth never grew before brown bread was known; and they can tell to a cog when you are going to twit them of having the gout, and tell them what to eat and drink, and how to make their lives a burden generally. They can tell where you were the night before, or the life before, and they can guess where you will be during the next night and the next life.

They know when you are going to tell of the cases of pyorrhea you have cured—a broken cog may make you say "endured." When old age can be cured, it need not be endured.

A celebrated man of letters, on the downward side of life, in speaking of his health in general, said to me he had observed that he got better, but never got well.

These mind-readers can also tell when you are going to describe how you went into the antrum. The cogs will not let you tell how you went through into the eye.

They know when you are going to tell about a new gutta-percha—the best you have ever used. During the last twenty years, you have tried and described so many new kinds, each better than the old, that when a test is made of the kind you are now using the conclusion is what poor stuff you must have started with! If the enthusiast who goes off at half-cock can be trusted, gold, amalgam, and oxyphosphate, in the same way, are getting better every day.

Following in the line of the new photography, they can photograph not only your bones, but your very soul. But you can snap your fingers at them if your mind is full of sweet thoughts, and your heart is overflowing with good impulses, and your moral nature is set to the great loadstone of the right, as the sailor's compass to the North star.

It is a mistake to believe that honesty is not the best policy. The man who said he was sure of it because he had tried both, was armed with an unanswerable argument. If you are not certain, try both for yourself and see. An object lesson may convince you. It is human to want to be Big Injun. If you must have Big Injun on one side of your shield, put Honest Injun on the other.

When you are half through with a large gold filling, and you find that it "rocks," what happens if you go ahead? You lose your filling, your patient, and, if you have not the hardened conscience of an old offender, your self-respect. If you stop like a man and do it over, you will save all you would have lost, and more, for you will gain in what Dr. Crouse calls spiritual growth. An exalted spiritual condition alone makes this existence bearable—in fact, makes it nearer like heaven than anything we yet know. You talk about going to heaven when you die! That may mean delay, as you may be long-lived! If heaven exists in the mind, as some believe, and can only be attained by right living, as all admit, there can be no question as to which course to take when confronted with the dividing ways. Since heaven is a good thing, why not, like a wide-awake business man, bid for it, as for a good bond, without delay? Perhaps because there is enough of it for all, there are not so many to compete for it.

It is a mistake to expect to find many patients whose ancestors had poor teeth. You will be told that their grandparents died at ninety, without having lost a tooth. You will also be informed that mother had a beautiful set when she was a girl, and father had a double row all around!

It is a mistake to expect to find a patient who ever breaks an artificial tooth by dropping the plate in the wash-basin or on the floor. Artificial teeth are always broken while eating soft bread or custard pie, and natural ones are broken from the jar of going down-stairs.

It is a mistake to allow your surroundings to be slipshod and untidy. A well-regulated house is the outward expression of a well-regulated mind. If your patients see cobwebs on your ceilings, they will expect to find cobwebs in your brain. If they see your rooms in disorder, they will expect to find your work mussy and careless.

It is a mistake to adjust the rubber-dam, give your patient the morning paper, and go into the next room to gossip with another patient, or out to take a drink, or down town to see how stocks are going. While you are gone the cavity also will be getting dry and painful, and your own stock will be going down.

It is a mistake to adjust the rubber-dam, put on a clamp, and prop your patient's mouth open so that speech is impossible, and then talk Democracy to a believer in Republicanism!

It is a mistake to brand your patients with gold crowns in the front of the mouth; when you round them up, some may be missing. Slip your card into their pockets, not their mouths.

There is an old saying that when your nose tickles, people are talking about you. When some men get a chance to set a gold bicuspid they are tickled to death.

With such a crown it is indeed all gold that glitters! Like the sun, it shines for all. The friends of your patients will say to them, "You have been to the jeweler's, haven't you?" They can't deny it.

It is a mistake to call Smith a quack. In the first place he may not be one, and in the second place he may have called you one, and in that case the patient may put you both on the same level. If you call him a gentleman, the chances are the patient will think you are one. If you cannot call him a gentleman because he is not one, you can change the subject and talk about the weather. That is a new subject, and one that is always open for discussion. It comes under the head of new business. It is in order after discussing other people's business.

It is a mistake to get mad at Brown, who is your peer, and call him names, because he does not see things through the same lens with you. You should be polite to all, but scrupulously so to a professional brother. The code of ethics says so, but an unwritten law, higher than any code, affirms it with the authority of all the ages. If you become a child again, and scold him, or, worse still, fail to scold him because you will not speak to him, when he dies you will feel sorry, and will realize that you have been narrow-minded and unkind. When you die it will be too late to exercise the charity that was all the time in the bottom of your heart, as it always is, or ought to be, in every human heart.

In your society it is a mistake to get angry with Jones and slip your collar because you think he is not an agreeable mate to pull in harness with. What is society work for, anyhow? If it is for fun, you can do better. If it is a duty you owe your profession and your time, the question of your own pleasure is the last one to think of. There are bigger things to live for than to spin like a top around one's own self.

Society work and the game of marbles have little in common, except—human nature. If you are having a game with Johnnie, it is not manly to refuse to play because he wins. Some one must win if there is to be a game. If you win all the time, how will he feel? Give and take is a manly exchange. Give—an equal chance; take—the consequences. Since the world began, no quality of human nature has been more potent than that of manliness. It makes chiefs among barbarians, and heroes among civilians. It is a quality that becomes woven into the texture of men, and leaves its stamp unerringly and indelibly. You can tell a manly fellow as far as you can see him, and without the help of the X rays.

It is a mistake to stay too much at home in the dark when the professional world is full of light that "shines for all." You may fall into the habit of magnifying your own shadow, and sitting up with it, with the feeling that you are in good company. You may thus waste your time with a spook as unsubstantial as the stuff dreams are made of, and not as agreeable. You are likely to become centripetal and selfish, when you ought to be centrifugal and ready to fly to pieces for the good of others.

If the dental fathers had coddled their shadows instead of organizing a profession which they have handed down to you, you might now be sawing wood instead of strutting with a cane and being called

Doctor; or you might be walking instead of riding, like Æsop's fly on the axle, proud of the dust you think you are kicking up. While you accept from them knowledge that is now as free as air, does it ever occur to you that you should try to add a little as you pass it on to those who are to come after?

It is a mistake to allow yourself to become prejudiced against modern improvements. Think of modern railways, ocean steamships, twenty-two-story buildings, the New York *Herald*, the telegraph and telephone, all the results of modern materialism, and yet working together to bring us all into closer relationship, and aiding to bring about the time when the spiritual conditions will be such that it will not seem Utopian to talk of the doctrine of the brotherhood of man!

Dentistry is one of the latest outgrowths of civilization, and is a striking example of the vast difference that lies between the civilized man and the barbarian. This is shown by the willingness of the former, and the unwillingness of the latter, to bear present pain for the sake of future good. The more intelligent people are, the more willingly do they bear exacting dental operations.

Yet it is a mistake to consider dentistry an unalloyed good! The poet, weary of the world, said, "Solitude hath charms!" Adam doubtless felt the force of this when he was a baby. There was no nurse to stick pins in him in putting on his fig-leaves, and no one to trot him, in a manner to suggest riding over a corduroy road, when he had the stomach-ache; and there was no doctor to lance his gums when he drooled.

When he was big enough to play "shinny" and eat green apples, there was no dentist on earth to fill his temporary teeth on or near the pulps, so that when he went to the seashore, or the mountains, in the summer, he would be sure to enjoy his vacation.

It is safe to assume that when he grew up he had regular teeth, for there was no one to prematurely extract the temporary molars, and let the permanent ones slip forward and "jumble" the bicuspids and incisors when they came in. An imprint of his front teeth made, for instance, in a Newtown Pippin (his favorite fruit), would have shown a well-developed arch, with the teeth in proper position.

He never wore a regulating plate so adjusted that he could not eat nor sleep.

The thought of Christmas and Easter, when he was to come home from school, did not suggest to him a smell of creasote, and the certainty of having his lips and face burned with carbolic acid, and the possibility of having the nerve touched; he didn't have to ask—Is it going to hurt?

He had no fear of a cross-cut file run between his bicuspids by the monkeying hand of a carpenter, or a Perry separator screwed up by the muscular arm of a blacksmith.

He enjoyed other lonely advantages. When the ice melted in the streams, he could go trouting with the certainty that no other boy had been on the brook ahead of him. There was no boy on earth to borrow and break his Leonard rod, or lose his jackknife.

In the springtime when his fancy lightly turned to thoughts of love, he doubtless cut and combed his hair, and brushed the gums off his teeth, and "spruced up" generally, as boys do when mating time comes 'round. This peacock-like attention to plumage, however, was unnecessary, for there was no one in the world to cut him out. Mother Eve had no intention of writing "spinster" after her name, and for once the course of true love must have run smooth.

Later, when the honeymoon was over, and the realities of life stared him in the face, and he was twitted of staying out late at night, and was told he was a wretch, he did not have to adjust a set of ill-fitting uppers in order to speak plainly in denying the appellation, because, as before stated, he had no dentist, and his teeth, therefore, were doubtless good.

In old age he may have had erosion, caused probably by malic acid. At least that explanation was as handy as any. The Uric-Acid Age had not yet arrived.

It is a mistake to ignore the rubber-dam, as well as a great number of other modern devices by which operations on the human teeth are made more comfortable and more certain.

One who uses the rubber-dam need not be alarmed by the fact that "there is a tide in the affairs of men which, taken at the flood, leads on to fortune," etc.

He can smile with pity when he thinks of Noah's dentist, who probably preferred soft gold because he had to use it wet. But the world moves in spite of the deacon who said it doesn't, and it is a long step from soft gold and Noah's menagerie down to Barnum's Greatest Show on Earth and his namesake's rubber-dam, and Cohesive Gold.

Archeologists may differ in their estimates of the relative greatness of those two showmen, but there can be but one opinion as to the inventor of the rubber-dam. He will always stand before the world, high and dry on his own pedestal, and from his time events in the dental world will be recorded as before, or after, the flood!

It is a mistake to reject the dental engine because it cuts rapidly and may do harm. A good razor will cut your beard, or your throat. Shall the razor be rejected because some men hack at their jugulars with it?

Shall men stop shaving with the razor because it is sharp, and use the bread-knife because it is dull? There are men who bid for patronage on the ground of not using modern appliances.

It is a mistake to be frightened because you hear a noise. You will be told by Obadiah Gonetoseed, A.M., M.D., D.D.S., if you plant a tooth you may be in danger of planting a patient. But who has ever heard of an expectant undertaker—who professionally looks most sad when he feels most glad—being made joyous from a rush of business from that operation?

In these days of advanced agriculture, a planter must know his soil, must be sure of his seed, and must understand the rotation of crops. If he is a wide-awake Yokel, he will know that he must sow his buckwheat when the chestnut trees are in bloom if he expects it to ripen before the frost falls, and he will understand that he must put his rutabagas in a soft loam if he expects them to root deep and take the prize at the county fair! Under the sun by day and the stars by night, and moistened by the dew and the rain, and coaxed by the south wind, the miracles of nature will be performed, and the seed will swell and burst and grow toward heaven, and fill the fields with blossoms and honey bees, and the barns with grain, and the planter's heart with gratitude and joy. A tooth may not have the potentiality of a seed, but an imaginative mind may well believe that it has a sort of reminiscent memory, and when placed in the conditions under which it grew it takes to its environment as a duck to water, and the miracle of nature is again almost performed, for it snuggles down comfortably and "grows" as if in its own home. The lilies that bloom and toil not are not more wonderful than the great healing impulse that ever wells over from nature's abundant heart.

We are making daily progress on the mechanical side of our profession, but "where are we at" when we consider this great healing process, and where are the prophets who can lift the veil and, by divine authority, tell us just how an injured pulp heals, and how an implanted tooth grows firm and becomes comfortable?

Dr. Atkinson, with prophetic insight, used to say that we could never know how much nature would do if given a chance. If he were alive to-day, he would implant teeth with the confidence and authority that was natural to his hopeful nature. How we miss the inspiration of his non-conforming spirit, and how we forget his eccentricities when we think of his life-long protest against the mildew of musty conventionalism!

Since he is dead, John Henry Dryasdust, M D.S., can walk the world in peace, knowing there is no fearless Don Quixote loose, ever ready with his trusty blade to fight the windmills of conventionalism and puncture the windbags of conceit.

And, by the way, John Henry's M.D.S. is a little more than M.D. and a little less than D.D.S.,—a happy compromise between the two. It reminds one of the Thompsonian doctor who prescribed for his patient No. 6 and No. 8, but, finding he was out of both, gave No. 14, saying it amounted to the same thing.

It is time for the profession to correct the mistake of having so many titles out.

It is a mistake to fly into a passion at the sight of a red rag. You expect a bull to do that. It is in a line with his nature. But would you expect it from a man who claims to be made in the image of his Father in heaven?

Buddha taught the subjugation of self and the elimination of desire as the only means of reaching Nirvana, or a state of perfect rest and peace, and after 2500 years his followers number 350,000,000 souls,—a strong argument in favor of self-control.

Even the stars set you a shining example of patience. They never fall out.

It is not necessary to get angry because a patient wants to direct your work, or gives you advice that should come only from an expert. If you control yourself, you may be able to control your patient. For every patient who takes the operating chair there must be an adjustment of what, for want of a better name, may be called personal differences. In the beginning of the hour's work your hair and that of your patient may bristle, but if you will grip yourself and think of the world's noble army of martyrs who were patient to the end, in a little time the equilibrium—mental, spiritual, or electrical— will be restored, and when your work is finished and your patient leaves the chair, you will fall on each other's necks and swear undying friendship to the end of time.

In your society work, when some one proposes something that rubs the fur the wrong way, if you will grapple with yourself, instead of with your opponent, and keep your temper, and try to convince yourself of the error of your own way, in a few minutes you may come to an understanding with your enemy, and in a few moons you may become his fast friend.

To be bound to your brother by a bond of patience, and a mortgage of charity, is to run in debt for an investment that pays a better per cent. than any bond you can buy on the market. The Divine Comptroller of that kind of currency will see that the interest is paid every quarter.

It is a mistake to read your poetry to a busy man who is president of six railroads, and owner of a water privilege in Maine. His mind doubtless runs on dams, and if you take his time with your sonnets he will want to damn you as well as his river. Nor should you read your effusions to a pretty, sympathetic woman, who, when she is through with you, has an engagement at the dressmaker's. Her sympathetic manner is a way she has, and would be the same if you, or any one else, were to read to her from Tupper's Proverbial Philosophy, or Kames's Elements of Criticism. It may interest you, but it does not her. What you read to her goes in one ear and out of the other. That is what the other ear is for. It is a providential provision against the damming up in the mind of all that one hears.

A dental office does not give quite the proper background for your poetical efforts. Bob Ingersoll says you cannot exactly write a poem to a pump, though you may to a crystal spring. Poetry and science are equally well in their way, but, like some chemicals, they will not mix. Science is for the garish day, when you have your working clothes on ; poetry for the evening hour, when the body is relaxed, and when the mystic background of the twilight entices the soul from its shy retreat. And what is here said of poetry applies equally well to all your other hobbies.

It is a mistake to attempt to operate too rapidly. It encourages a high-pressure habit that will make a cyclonic terror of you. There will exist around you a zone of low barometer, that will make sensitive people know that a hurricane is impending. They will think of the "Quick and the Dead," which means, when translated, "Quick operator, Dead patient!" Your fingers will fly about their mouths in a manner to suggest forked lightning. While your hair flies in the breeze your motions make, theirs will stand on end.

You may be able to do good work (which is doubtful), but why be in such a disagreeable hurry about it? Haste is vulgar. It takes several generations of good breeding to produce the unconscious composure that marks a gentleman.

Rome was not built in a day, though it was burned in a night. No great work of art was ever hurried. The great Masters had no time to waste in haste. Some of them were doubtless humbugs, and they have all, in this age, been worked for all they are worth, yet the fact remains that living before industrialism had swept over the earth, and before the subjugation of the electric current, they found time to work out their highest conceptions, and the world is immeasurably richer because they lived.

The assertion is probably a safe one that any work of art, in any of the great departments of art, that does not produce upon the mind a feeling of composure and restful completeness, falls short of being truly great. This applies to painting, sculpture, and architecture, with equal force.

When applied to our profession the analogy, of course, is not quite fair, for dental operations are produced for practical purposes, and artistic feeling cannot always be expressed in them ; yet there is some reason for the comparison, for a regard for the law of art in their performance will often produce the very best practical results.

Dr. Edward Maynard would have been a great artist in any department of pure art, and his artistic temperament made him, considering the primitive conditions under which he worked, one of the greatest dentists the profession has produced. And patient deliberation was the keynote of all his work. Instead of scaring his patients by a nervous manner, he exerted over them a quiet influence, and hypnotized them into a state of confidence, so that he could accomplish artistic and lasting work for them.

It is a mistake to believe that the devil is dead. Some good, trusting souls consider that he was a barbarian, and reigned supreme only in barbaric times, and that his power has diminished with the advance of civilization. There may be a grain of truth in this, for

> "I doubt not through the ages one increasing purpose runs,
> And the thoughts of men are widened by the process of the suns."

But still his Majesty is potent and powerful in the world to-day, and no scheme of life can be complete that leaves him out. He can read and write and cipher, and knows how to assume all the graces that are the latest and choicest attainments of the race.

When your neighbor sneaks a patient away from you, and with a smile that is childlike and bland praises your work, and then damns it with a shrug and a pained look, as of deep regret that you should fall short in any particular, you may look for the horns and hoofs. In the guilelessness of your trusting nature you may not quite comprehend, but when you are older and wiser you will recognize the satanic symbols.

The remedy? There isn't any, unless it be to move to another hemisphere. But he is a citizen of the world, and will be there ahead of you. Then you will have to move back. Your best hold will be to stay at home, and study the teachings of religion, and learn patience, and try to put in better fillings.

He does not always masquerade in the persons of your neighbors. He is a sly party, and if he gets a chance, will creep into your own heart. While you are alone in the desert of Sahara, even, he may catch you napping, and hum his cadenza in your inner ear. He is a hard party to fight with, as he will take advantages you will not stoop to. After all, it will be best to let him alone. If you have to touch him, do it with a ten-foot pole.

It is a mistake to believe all you hear. You will be told that you must always extract the first permanent molars. Then you will be told not to extract them, not even their roots. You will be warned against the sin of destroying exposed pulps, and then you will be told to destroy them on sight. You will be warned that you must never, never, use amalgam : it will blacken your hands, your patients' teeth, and your reputation. So it will, if you shovel it in as you would coal.

Occasionally, perhaps, you may be told to use judgment ; but you may distrust the advice, because it sounds commonplace, and may, after all, be only a phrase for a mediocre chap to hide behind. It may mean something, or it may mean nothing.

What a comfort, after all, that you do not have to practice your profession with somebody else's brains ! How many sinful spaces it keeps you from cutting between natural teeth ; how many big holes it keeps you from making by a timely pat of gutta-percha placed on an approximal surface under a ledge of enamel (only to have a watering-place dentist, who knows no more about ethics than about operating, take it out, and cut through the grinding surface, and put in a huge contour filling that failed in just eight months) ; and how many sets of young teeth it helps you to straighten, by leaving in the temporary teeth until nature expels them ; and how many tears are saved to the sweet eyes of childhood by the use of plastics, when employed for your patients' children as for your own ; and what is more important, how many good teeth are saved by that practice, while the little ones are slowly growing out of the woods, or out of the bacterial swamp of childhood, which is worse than the woods !

If it is a mistake to believe all you hear in reference to what should be done, it is also a mistake to believe all you hear in reference to what has been done.

You will be informed before a room full of waiting patients that a filling you put in six months ago is out. Many others had been informed of the fact before the patient reached your office. It was talked of in the cars, on the street, and wherever there was an exchange of news. When comparison with your record-book is made, and it is shown that your filling is still in, it is a mistake to expect the patient to go in the waiting-room and correct the error, or out through the by-ways and hedgerows and head off the lie that has been started on its wild career. Yet the patient will resent the idea of intending to do an injustice.

And your neighbors will talk about you in the same careless way. It is the penalty you must pay for living. They will say that so and so is probably the case. When repeated, it will appear that so and so *is* the case. If it were said before your face the error might be stamped out, but when repeated behind your back it goes like wildfire over a dry prairie. Once under way, with a favorable wind, it cannot be stamped out, and it leaves ruin and desolation in its track. How shall you escape its ravages? Keep the grass in the broad fields of your life fresh and green, and moist with the dew of eternal truth, and the burning brands will sputter and go out, though the winds may blow a howling gale.

The world is full of liars who have no intention of being untruthful. They are people who pay their bills, and whose word is as good as their bond, and who keep out of jail. But they are careless ; they think and act loosely ; they are not considerate of others ; in little things they lack a plumb-line inside of them to true their actions up to ; and they are forever making trouble for themselves and their friends. ("And withal they learn to be idle, wandering about from house to house ; and not only idle, but tattlers also and busybodies, speaking things which they ought not."—Paul's first Epistle to Timothy, v. 13.)

A lie is a fast runner, and will spread the news long before the truth, out of breath, can catch up and edit and correct it. Perhaps a lie is a fast runner because its case is weak and needs speed ; and the truth is a little tardy because of the conviction, founded in the nature of things, that its cause is holy and needs no haste.

It is a mistake to believe that this life is an ideal one. You thought so once, when the bloom of youth was on your cheek, and when, fresh from Plato and Socrates and Marcus Aurelius, and that modern Plato, the incomparable Emerson, the heavens seemed opened and glorified, and the earth was a beautiful arena for the enactment of your noble deeds.

There was no uric acid in your blood then, and no creak in your knees, and no ache in your heart for the dear friends who have since dropped out into the Great Unknown, and for the other friends who have fallen out, though they still live in neighboring streets.

You never asked then if there are illusions in life, and you had not found out many of the delusions. You did not know that, unconsciously, you invested your friends with your own qualities of mind and heart, and expected them, as a matter of course, in any emergency, to do as you would have done under like circumstances. If you were inclined to be devilish, you expected them to be the same ; if you wanted to be patient and charitable, you looked for the same qualities in them.

You did not fully comprehend the fact that the Old Adam in the race is not yet outgrown, and that our modern life is, after all, a form of polite warfare ; and that many who theoretically commend the beauty and holiness of peace, like the Puritans of old, still carry the Bible in one hand for justification, and the sword in the other for "business."

You had supposed that Christian charity had so encompassed the world that the swords were to be beaten into plowshares, and the spears into pruning hooks, and that men were to sit at last under their own vines and fig-trees, in the enjoyment of peace and plenty, and with nothing to make them unhappy or afraid.

Instead, even the nations, armed to the teeth, "sass" each other like bullies in a country school, and stand ready to come to blows, for the sake of what they call a "justifiable principle." And the world, trembling for the consequences, but not bereft of its senses, says, "How unnecessary !" But when men are angry they lose their heads, and at such a time the example of the Master is not remembered.

"A mild answer turneth away wrath," but, alas ! who can be found to utter the gentle words? Or being uttered, what chance that they will be heeded?

It is sometimes a mistake to think aloud. What has been expressed, you will say, is to no purpose, because one must act, not think. The sum total of a life is made by deeds, not thoughts, or words. And one must not expect ideal conditions in the present world.

If the views expressed are not altogether creditable to human nature, it must be remembered that this paper is on the subject of mistakes, and it must deal, therefore, with the weak side of human nature. The pessimist says there is no rose without its thorn, but the optimist says there is no thorn without its rose. If the latter is correct, the prick of the thorn should only fill the mind with thoughts of the rose.

When you commenced practice you almost scorned the idea of the societies and journals giving so much time to the treatment of pulp- and root-canals. You expected to establish such ideal conditions among your patients that pulps would not be exposed. You thought you would educate them to come to you regularly and often, so that large cavities would be seldom found. You did not know then that they would be busy with their own affairs, and that you would be remembered only when they felt a twinge.

As you grow older you find the nerve-paste and root-canal instruments indispensable. And finally you settle down to the conviction that professional life is not ideal, but is very prosaic and very practical. As your heart becomes more mellow, as it is sure to do with advancing years, and your affections take a deeper hold, you will see that your mission is not to lead the ideal life, but it is to be useful to your fellow-men ; and the measure of your happiness, after all, will be marked by the extent to which, in your practice, you can relieve your patients from the ravages of pain and disease, and in your societies can forget yourself for the sake of the public good.

It is a mistake to take the bull by the horns. Follow Josh Billings's advice and take him by the tail, so that you can let go when you want to.

It is time to let go of this paper. The greatest mistake of all, you will say, has been in holding on to it so long and making it such a rambling and undignified one. Professional literature, you think, should be dignified and formal. So it should be, but it need not have its shoulders thrown back to the point of falling over backward. If a new instrument or a new process is to be described, or a new fact recorded, or a new formula stated, the cold language of science must be used.

But it need not be so cold that the North Pole would seem like a red-hot poker in comparison. If our writers would warm up a little more, perhaps there would not be so much complaint that our journals are not read.

There is a human side in professional work and in professional literature, and it finds its most direct and forceful expression in the current language of the day. Some of the semi-slang of to-day, though at present refused admittance to the company of polite letters, finds itself received a few years hence even among the elect. Why? Because it clearly expresses the bubbling, irrepressible overflow of the human heart, from which all language springs. In this way language grows, and it becomes more direct and terse and more expressive as the great heart of humanity, in keeping pace with the age, beats with accelerated intensity. And this heart quality keeps all the world akin.

But, after all, the question of the hour is, What has one to say?—not, How shall it be said?

If the message is one of truth, it matters little if it is uttered with classic elegance, borne on the rasping tones of the fog-horn, or whispered by the tattling breeze.

THE DENTAL FILLING.

BY JOSEPH HEAD, D.D.S., PHILADELPHIA, PA.

(Read before the New Jersey State Dental Society, August 1, 1895.)

FOR the last fifty years dentists have declared that a filling must be water-tight, forgetting that the tooth itself is thoroughly pervious to moisture, and also forgetting that many fillings which admittedly leak keep on preserving the tooth-structure indefinitely. Jack has put in soft foil fillings, under water, that have done good service for years. Elliott's observations concerning the universal leakage of amalgam plugs are verified by the daily experience of each dentist, and yet who will say that in spite of leakage amalgam does not save the teeth well?

Drop a fresh tooth, filled with gutta-percha, into aniline ink, and at the end of five minutes the entire cavity under the filling will be stained.

The oxychlorid of zinc and oxyphosphate of zinc are permeable to moisture; nevertheless cement and gutta-percha are indispensable to those operators who would serve the best interests of their patients.

Cohesive gold and tin are claimed by their admirers to be non-leaking materials, but when a tin or cohesive gold filling is first carefully cleansed and then melted, a decided odor of burnt organic material will be perceptible, which would seem to emanate from the interior of the metal. In the light of this fact further proof is necessary before cohesive gold and tin can be said to positively seal the cavity margins. And if they should be proven to absolutely seal such margins, the mere fact that the other materials frequently preserved teeth would be conclusive evidence that leakage of moisture in itself is not a serious objection.

The destructive electro-chemical action of filling-materials on the teeth, once so strongly advocated by Chase, has been proven by Miller to be untrustworthy; and if Miller's experiments had not been so conclusive, the daily dental operations where tin and gold are advantageously combined would of themselves, as years go by, prove the electro-chemical action in the human mouth quite harmless.

That such currents do exist at times no one who has put an amalgam filling in an acid mouth containing gold can for a moment doubt. And it is certainly true that such currents are invariably accompanied by chemical dissolution; but practically no harm results, as an insulatory coat soon forms on the amalgam which effectually puts a stop to any serious corrosion. Instead of saying that an efficient filling should be absolutely water-tight, and should have no electro-chemical action on the teeth, might it not be said that the perfect filling will exclude bacteria from the cavity as thoroughly as would normal enamel,—in fact, that it will exclude them absolutely?

Let us see if we have such a filling-material. Oxychlorid and oxyphosphate of zinc leak bacteria, the proof being as follows: Hollow balls of oxychlorid of zinc and hollow balls of oxyphosphate of zinc were thoroughly sterilized, and then dropped in a solution of bouillon that had been inoculated with a decayed tooth. At the end of five days they were opened. The bouillon had filtered through the substance. The bouillon found within was swarming with bacteria.

Gutta-percha was tested as follows: Several old cuspid teeth of dense structure were drilled through from end to end, the pulp-canal being eradicated. With proper precautions these were sterilized and filled at each end with gutta-percha, a small pellet of cotton soaked in sterilized bouillon being left inside. These were subjected to steam heat for an hour, five separate times, an interval of a day elapsing between each heating. They were then placed in tainted bouillon. At the end of five days they were examined, and the cotton soaked by broth was found to contain cocci, diplococci, streptococci, and staphylococci. The reports of these two experiments are given at full length in the June number of the *International Dental Journal.* The gutta-percha test is not conclusive, as Miller has shown that bacteria may very occasionally penetrate the normal dentinal tubules; but at least the experiment would seem to indicate that gutta-percha could not keep them out, which is the real point at issue.

That valid amalgam fillings at times leak bacteria as well as moisture, no experienced practitioner will deny.

Tin and cohesive gold are the only materials that may exclude bacteria. That they do exclude them is yet to be proved. Soft-foil fillings have been picked out from cavities by the explorer in a pulpy, evil-smelling state, to all appearances full of bacteria, and yet the dentine beneath has been found firm and sound.

It is a most astonishing fact that soft-foil fillings may be soft and mushy without the least harm to the protected cavity; while, if cohesive-foil fillings are soft or defective on the edge, decay almost invariably sets in. Miller claims that soft foil has a slightly antiseptic action, which is lost in annealing. It might be said that a not too dense filling would be less likely to dangerously expand or contract under the action of cold or hot drinks. But these explanations do not seem sufficient. The questions raised by these facts cannot as yet be satisfactorily answered, and I hope some experiments on this subject, which are now in process, will give more positive light.

How is it that fillings can leak bacteria and still preserve the teeth? The fundamental principles of dentistry would seem to be shaken and antisepsis set at naught did we not remember that the quantity of bacteria, and the presence or absence of a suitable culture, is a most important factor in the process of decay.

Every man in a state of health, passing through the city, may safely inhale a limited number of smallpox germs, as the tissues and white blood-corpuscles will destroy them.

If, however, he works in a hospital, or wears the clothing of a smallpox patient, the number of germs taken into the body overcomes the hygienic police force, and the man falls sick. The same principle applies to tooth-fillings. The tooth can resist the onslaught of a few bacteria, and, it would seem, destroy them, as is shown in the case of mummified black decay. Moreover, many bacteria need the presence of air, and all need a constant supply of food. The fillings tend to exclude both of these essentials for bacteriological propagation.

In spite of the fact that a useful filling may leak micro-organisms, there should be no pains spared to adapt each plug as accurately as possible. The more perfectly a filling excludes bacteria from a sterilized cavity, the more certain the chances of permanent success.

And after all has been said against filling-materials and defective conditions of the saliva, it seems probable that the great majority of our failures arise either from hasty preparation of the cavity or unskillful manipulation.

In my opinion, a gold filling, either of soft or cohesive foil, if it has perfect adaptation to good enamel-edges, will preserve the tooth as absolutely as if the original enamel remained dense and undecalcified. A filling at best can only restore the tooth to its original condition of perfection, and if the acid and bacteria, which originally created decay, should attack it again, there is no reason why the tooth-substance should not disintegrate a second time. This is an unanswerable excuse and may convince the patient many times, but if decay recur too often in the same place, the coincidence is most unfortunate for the dentist.

I am well aware, from my varied experience in dental meetings, that there are numerous practitioners who always do absolutely perfect work ; whose hands never tremble from fatigue at the end of a long day ; whose weary eyes never by any possibility overlook small concealed portions of decay that ought to be removed. These practitioners will not need the suggestion I am going to make, because when no fault can exist no precaution is necessary. But to that large and most useful class of dentists who, in spite of a personal element of error, engage to relieve pain, preserve teeth, and make mouths wholesome,—to them I would say : After the gold filling, approximal or crown, is inserted to the best of their ability, let them polish it down almost flush with the enamel-edges, and rub in thoroughly a mush of amalgam. When the patient returns, they can polish all the amalgam off and finish the filling, which will look untarnished and resemble any ordinary filling except in one particular. Should decay attack its borders, the conscience of the dentist may be quite clear. Should it be feared that the enamel may have been powdered by injudicious malleting, scrape the edges well with an explorer and syringe with pure water before applying the amalgam.

Of course the amalgam that fills up any small fissure will shrink, while hot and cold drinks may cause the gold to expand and contract from the cavity walls. But objections to gold fillings are now out of date. Gold for upward of fifty years has prevented decay. The teeth can successfully antagonize a small number of bacteria, and it is my opinion and my experience that the edges of a gold filling, guarded with amalgam as described, will successfully prohibit the dangerous entrance of micro-organisms.

INTERDENTAL SPACE GUARDS.

BY DR. M. W. HOLLINGSWORTH, PHILADELPHIA, PA.

It is the purpose of this article to call the attention of the profession to a simple yet durable method of filling certain cavities in the deciduous teeth, which operation may otherwise be troublesome and uncertain.

The accompanying cuts will serve to illustrate the typical conditions under which the method is especially applicable and wherein the device may best fulfill its design.

It will be observed in Fig. 1 that the adjoining approximal cavities separately present surfaces glenoid in character, offering little more than enamel for lateral walls in which to prepare the necessary retaining grooves or pits. Sensitiveness, close proximity of the pulp, or temperamental characteristics of the child may render it inadvisable to prepare means for the retention of the fillings in portions of the teeth having more substance. Under these conditions the adhesive quality of a good cement is at present our main dependence, unstable and briefly serviceable though it may be.

FIG. 1.

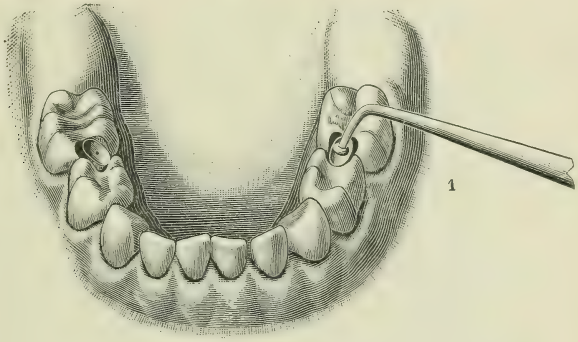
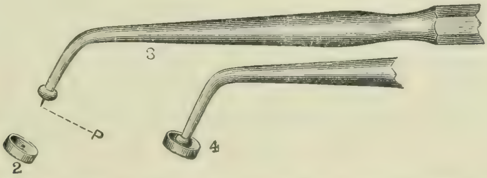


Fig. 2 (2) represents a metallic span or bridge with concave and convex surfaces, elliptical in outline, and having in its center a perforation.

FIG. 2.



In the prepared state the metal spans have upon their under or convex surfaces a coating of gutta-percha, a portion of which is presented through the central perforations. The spans may be of various sizes, adaptable to the different conditions presented.

An instrument by the aid of which the prepared spans may be properly and conveniently placed and pressed into position is represented by Fig. 2 (3). The instrument is so formed as to approximately fit the concave metallic surface of the span, and also engage the gutta-percha presented through the central perforation by means of the point "P," which provisions reduce to a minimum the surface subjected to the adhesion of the gutta-percha. The point "P" also acts as a pivot upon which the span may be rotated to any angle desired, becoming readily disengaged when it has served its purpose.

In the manipulation of the span, the instrument is slightly warmed and the pivoted point inserted into the perforation (see Fig. 2 (4), and turned to a convenient angle ; then sufficient heat is applied to soften the gutta-percha, when it is quickly pressed to place, as shown in Fig. 1.

The cervical borders of the adjoining cavities will thus be effectually sealed, and the interdental space bridged over and guarded against annoying encroachments upon the gum, either by food or by the additional gutta-percha required in contouring and completing the filling.

That the adoption of this method of preserving the deciduous teeth and protecting the interdental spaces would often relieve the dentist of much of the worriment incident to prolonged and repeated efforts which his little patrons and adverse conditions entail upon him, has been fully proven by the experience of the writer.

Of the relation which the deciduous teeth bear to their permanent successors, much has been written. Owing, however, to the many difficulties and exasperating experiences which beset the way to a close observance of the requirements made obvious by known principles and proven by experience, many are led to quit the path of strict duty to the rising generation, and occupy themselves in operations upon the older representatives almost exclusively. However much may be said in defence of this discrimination, there is a moral aspect which confronts the laborer in the sphere of dentistry which should clearly define his relation to his patients in general and set at rest any question of use.

He who thinks aright along conservative lines, and disregards his mere personal comfort, will admit to himself at least that what experience has amply proven to be true must be right : that the preservation of the deciduous teeth is of as great importance as is their function to the developing body.

It is not a question of utility alone, but of comfort as well. The irritableness of little children may often be attributed to an inflamed condition of the gums due to the pressure of food packed into the interdental spaces through openings formed by approximal cavities.

While the utility of the metallic *space guards* may find its best expression in their application to cavities of a certain character in the temporary teeth, they may be employed in the permanent teeth as well, where similar conditions exist and where temporary stoppings are required.

PULPLESS TEETH, ROOTS, AND THEIR TREATMENT.

BY ADAM FLICKINGER, D.D.S., ST. LOUIS, MO.

PROBABLY no single topic of the busy dental practitioner of to-day is receiving such earnest and thoughtful consideration as the treatment of pulpless teeth. For the past few years, even a casual reader of our numerous dental periodicals cannot have failed to observe the large amount of space devoted to treatises upon this important theme, which has been discussed from time to time by the dental societies throughout the land.

Roots, with proper therapeutic treatment, may be made to give service for years, in retaining the natural expression and contour of the face, by being crowned or used as piers for bridge-work.

This latter class of work, when properly constructed, is undoubtedly the most artistic and valuable substitute yet devised. For natural appearance, comfort, and stability it is unapproached by any other system of artificial teeth ; especially so, if constructed on a plan which allows its easy removal for examination and the addition of such other work as may become necessary.

A proper preparation of the roots and teeth is, however, imperative, for upon this the future success of this class of work depends, and its importance cannot be overestimated.

In referring to the treatment of teeth and roots to be used for abutments and piers, or for crowning, I shall presume that we understand both those whose pulps have died (through some of the various causes) becoming putrescent, and those whose pulps have become exposed and must needs be devitalized. While I may not present a system entirely new in the treatment of the former, the method of its application is certainly not old, and if carried out carefully in detail it will be successful in the majority of cases, causing less annoyance to both patient and operator, by recurring inflammation, ulceration, etc., than any other method I have practiced.

The first step in the treatment of teeth in this condition is to gain free access into the pulp-chamber and canal or canals ; then, in order that I may not force any of the contents through the apical foramen (causing additional trouble frequently harder to combat than the original one), I remove the contents carefully, using a nerve instrument " home made for the purpose," washing with warm water, and the sulfuric acid treatment so often described. In cases of tortuous canals much can be accomplished by sealing into the canals a ten per cent. solution of the acid for a day or so.

Having obtained a free and unobstructed passage, I apply the dam or other means of keeping the tooth perfectly dry, proceeding, if any abscess exists, with the beechwood creasote treatment, pumping it up and into the canal until it makes its appearance through the fistulous opening, after which I apply an electric wire attached to the alternating current and controlled by Holekamp-Moore, Grady & Co.'s alternating current controller, gradually increasing the heat in the ratio of thirty-four degrees to the minute. I then proceed with thymol or cassia, preferring the former for the anterior teeth, and apply the current again and again until every particle of oil is absorbed by the tooth.

When applying the current to the oil you will observe minute electrical sparks flying in all directions ; the heat alone should be sufficient to destroy microbes, bacteria, or any other kind of germs present.

I then fill the upper or apical part of the root with the following preparation, in the form of a paste composed of alum, thymol, glycerol, oxid zinc. Placing a small piece on an old broach with barbs removed, I work it up, not being over-particular how far; then take a small piece of heated gutta-percha, force it into the canal, which drives the preparation ahead, thoroughly filling the canal and sealing it better than any other preparation with which I am familiar, not excepting chloro-percha, oxyphosphate, wax, paraffin, etc.

For teeth and roots containing putrescent pulps, with no external opening or abscess, I use the same treatment, discarding, however, the creasote or carbolic acid, and proceeding with sulfuric acid, oils, and electric wire.

This method I have adopted in all cases, have used it in all conditions and stages of inflammation and ulceration, in acute and chronic cases. I have treated and filled root and tooth immediately, where a slight periosteal inflammation and swelling of the face still existed. In one case the tooth was so sore to the touch that it was impossible to use the mallet, yet I filled the root as described, and the tooth with gold, by hand-pressure; and to the great satisfaction of both myself and my patient the swelling and pain subsided after twenty-four hours, and to this day the tooth is doing well.

I may be accused of having gone to extremes, but so far the results have been so favorable that I feel the ends have justified the means.

In regard to mummifying pulps with the preparation of alum, thymol, glycerol, and oxid zinc, and acting upon the suggestion of Dr. Söderberg to "observe, compare, reflect, and record," I may state for the benefit of others that it is possible to mummify a pulp. I have experimented for years, and have succeeded in a great many cases with a preparation of arsenious acid, menthol, thymol, and glycerol. In 1877 I treated three first permanent molars with this preparation for my wife. After nine years it became necessary to crown two of them. Without disturbing the former treatment, I placed gold shell crowns over them, and to this day the three teeth have never given any trouble whatever.

Since the publication of Dr. Söderberg's article, I have concluded to use the preparation in the proportion he suggests for the purpose of pulp-mummification, but hesitate to go to the extreme which he recommends, viz, to remove the contents of the pulp-chamber *only*, leaving the canals untouched.

I have observed in my many experiments during the past twenty-three years with preparations too numerous to mention, that it is advisable to remove as much of the pulp as can easily be reached, though not necessarily all, mummifying the remainder. In fact, I think the day is not far distant when it will be an accepted fact that the successful treatment of devitalized teeth does not depend upon the complete removal of the pulp and the filling of roots to the apex, as is claimed to be imperative.

Science in general is making wonderful progress: why should we not solve this problem?

Fruit is successfully canned and sealed, wine bottled and sealed,—the older it gets the better,—bodies are preserved for centuries; why can we not seal up a small part of the pulp so as to cause no future trouble?

LEFT-CUTTING BURS.

BY DR. C. WITTHAUS, ROTTERDAM, HOLLAND.

WHILE yet a dental student I wondered why dental engine-burs were not made to cut by the reverse rotation of the driving-wheel, and my subsequent experience in the practice of dentistry confirmed my first impression that a left-cutting bur was needed to supplement the work of the right-cutting bur in many cases. I therefore had made for me some left-cut burs, which at once fulfilled my expectations and demonstrated their usefulness in many ways and places.

The preparation of dental cavities and the management of the enamel-margins is a subject of the greatest importance, and one which the eminent Dr. G. V. Black has lucidly set forth in the DENTAL COSMOS, yet it may suffice here to say that the enamel-margins should be smooth, have nearly right angles with clean-cut edges at the surfaces, which should be free from mutilation by chisel or engine-bur. In the use of the latter at whatever rate of revolution, the direction of the approach of the bur to the cavity-margin should, when practicable, be from within outward or along its interior edge lines.

This cannot well be done with a right-cutting bur, as is made clear by the illustration Fig. 1. The operation of a right-cutting bur in contact with tooth-substance tends to the movement of the bur over the surface in a direction at right angles with the axis of rotation, and that tendency toward the right must be constantly counteracted by the controlling hand of the operator. When, however, the bur is carried close to the cavity margin the bur teeth are apt to catch on the cavity-edge (see Fig. 1), and instantly force the engine handpiece and bur beyond the control of the operator, with the effect of mutilating the tooth-surface, wounding the gum, tearing or dislodging the rubber-dam, startling the patient, or otherwise surprising the dentist. In the illustrations the letter *C* indicates the cavity; *D* the dentine; *E* the enamel; *F* the filling; *G* the gum, and *P* the pulp; the arrows show the direction of bur rotation.

FIG. 1.

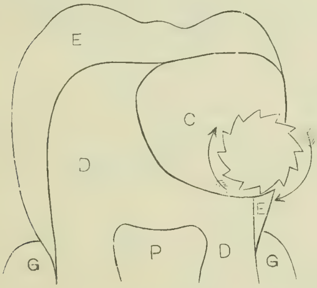
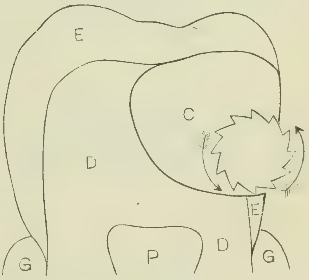


FIG. 2.



In Fig. 2 is seen the action of a left-cutting bur which, in this instance, will cut from within outward without danger of its running away over the cavity margin, with the disastrous effects probable if using a right-cutting bur in the same position.

In a cavity like that of Fig. 3, a right-cutting bur may be delicately and safely used without risk of its overlapping the cavity edge and playing havoc with the adjacent enamel and soft parts ; but if while in rapid rotation the bur be carried along the cavity border to the incisive region, even a very tense muscular grasp of the hand-piece would fail to prevent the catching of the bur teeth on the cavity edge with a probably unfortunate result. Nothing of the kind could occur in using a left-cutting bur under like circumstances, as shown in Fig. 4.

FIG. 3.

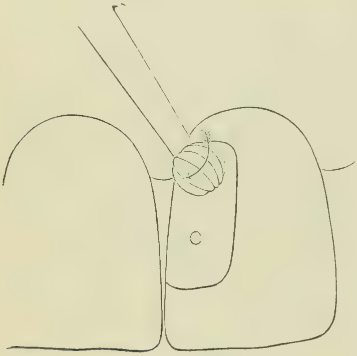
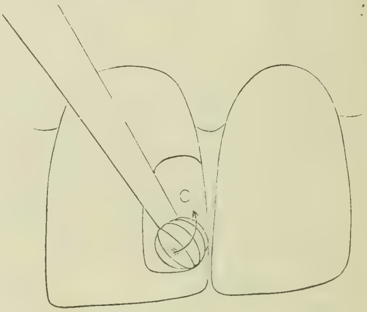
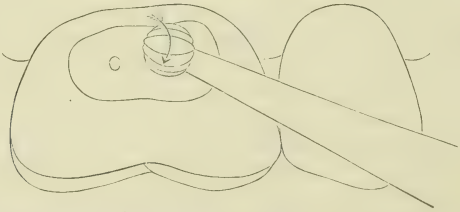


FIG. 4.



It is very important in the preparation of large cavities having thin walls, that the shaping and smoothing of the enamel-margins be done by slight touches with the bur, leading it with a very delicate feeling which is impossible when the danger of losing control requires a grasp of great firmness. Cases might readily be multiplied to show the occasional uses of the left-cutting bur, but for the present it must suffice to instance one of a not uncommon class, as shown in Fig. 5. Obviously, the employment of a right-cutting bur held at that angle for the preparation of the cervical border of such a cavity in the buccal surface of a molar, could hardly have other than calamitous consequences, which would be easily prevented by the use of a left-cutting bur, as indicated in the illustration.

FIG. 5.



For finishing fillings also, the left-cutting bur will be found useful. Fig. 6 shows a gold filling, *F*, in the morsal surface of a molar. The employment of a right-cutting bur in removing the redundant gold from the right side surface necessarily tends to the tearing away of the gold edge from the enamel-margin, as indicated in the cut, leaving a rift that may eventuate in the loss of the filling and the tooth. The use of a left-cutting bur on the same part of the filling, as shown in Fig. 7, would avoid the danger of disturbing that marginal fit of the filling and preclude the liability of its loss. These two examples clearly illustrate the supplemental uses of both burs for finishing purposes, as it is obvious that while the right-cutting bur in Fig. 6 does imperfect work at the right side junction of the filling with the enamel, it will properly cut the gold at the left side junction. On the other hand, the left-cutting bur of Fig. 7, though doing good work at the right side junction, would do very bad work at the left side junction.

FIG. 6.

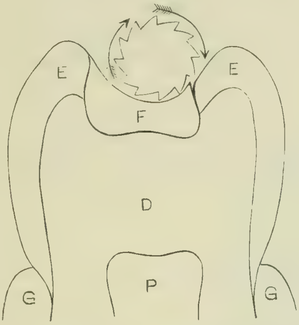
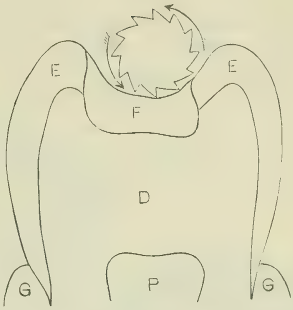


FIG. 7.



The writer has often had occasion to use left-cutting burs, and his experience of their practical utility has led to this communication, which he hopes will find favor with the profession and induce a trial of them. His confidence in their general adoption is only less than his wonder that he should be the first to direct the attention of his fellow-practitioners to their merits.

A MECHANICAL APPLIANCE FOR THE REPLACEMENT OF THE RIGHT SUPERIOR MAXILLA, THE FACE, AND A PORTION OF THE NOSE.

BY THOMAS P. HINMAN, D.D.S.,

PROFESSOR OF HISTOLOGY AND PATHOLOGY, ATLANTA DENTAL COLLEGE, ATLANTA, GA.

ON February 5, 1896, Mr. Levi P., of Buncombe Co., N. C., was brought to my office by one of my fellow-practitioners of this city, to consult me as to the replacement of the entire right superior maxilla, a portion of the nose, and the entire hard palate. On examination I found the right superior maxilla, the right nasal, the right palate, the right turbinates, and a portion of the vomer completely gone ; a portion of the left palatine process, the alveolar process around to the first molar on the left, the soft palate remaining intact. No photograph can convey a correct idea of the case as it appeared. These tissues were lost by the removal of a cancerous growth about a year and a half ago, there being no recurrence of the disease, the tissue being in a perfectly healthy condition. (See Fig. 1.)

The first procedure was to get a model or an impression ; I decided on the former, and accomplished it by the aid of modeling compound. I first filled the cavity with absorbent cotton, and then cut a piece of paper to approximately fit the opening ; before placing this in position I covered one side with vaseline, which was intended to prevent the modeling composition from adhering to the paper.

A large piece of modeling composition was then softened and placed in the part of the opening that was not filled with cotton, carefully pressing the composition to the edges of the cavity ; when this hardened it formed a base on which to shape the model. This I made by adding other small pieces of composition, forming them with a hot spatula and trimming away the excess with a penknife. This required about three weeks' time, giving from one to three hours per day to the work.

The inner surface being completed, I placed it in position, and then proceeded to model the face with a large piece of modeling compound, manipulating with my fingers and afterward trimming with my knife until it matched the other side of the face. (See Fig. 2.) This model contains about one hundred pieces of modeling composition. The next thing was its reproduction in aluminum, which I decided was the best material for the purpose. Not wishing to destroy my original model, I made a piece-mold of marble-dust and plaster.

FIG. 1.

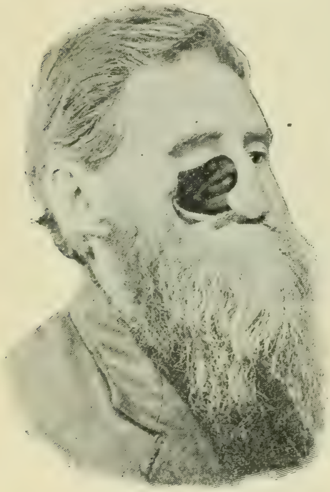
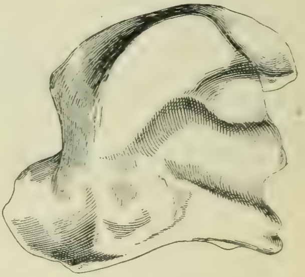


FIG. 2.



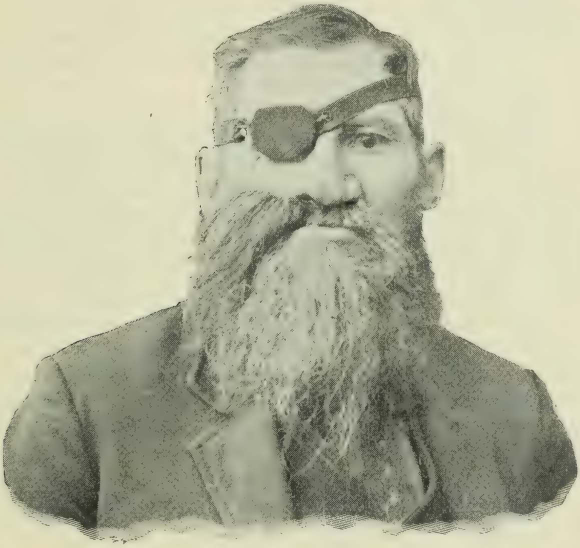
After the mold was complete it was tapped apart and the model removed ; the pieces were fitted in place and bound with wire. Taking a clay crucible, I drilled a hole in the bottom and fitted in it a piece of brass tubing ; this crucible was placed on the top of the piece-mold, the brass tubing fitting in a hole cut in the top of it, and the whole piece-mold was then covered with marble-dust and plaster and placed on a stove to dry out, this taking about twenty-four hours.

When dry, the crucible was removed, aluminum placed in it and melted ; the crucible was then placed on the piece-mold and the aluminum blown down by the cap and tube made especially for the purpose. When cool I removed the casting from the mold, and found it to be perfect in all particulars. It fitted perfectly, but proved to be too heavy, weighing six and one-half ounces Troy. I then decided to hollow it out, which was accomplished with twist drills and a large S. S. W. vulcanite bur; this was done on the lathe, reducing the weight of the cast to three and one-quarter ounces, or one-half its original weight.

Roughening the facial surface, I vulcanized S. S. W. pink rubber on it; this was stippled with a small bur to imitate the skin.

The case was placed in the hands of an artist for coloring, which was done so nicely that the difference would not be noticed by the casual observer.

FIG. 3.



I had a hair-dresser make a piece of beard and moustache to fit the case on the inferior external border, so as to cover the joint; this was attached by an elastic band, and could readily be removed. Two hooks were then placed on the superior external angles of the appliance, to which an elastic band was fastened with eyes sewed on the ends; this band going around the head furnished support, being adjustable. A silk eye-cover was fitted to the bands so as to cover the place of the lost eye, and I was greatly gratified to find my patient's appearance much improved. (See Fig 3.)

Before the introduction of the appliance the patient's speech was absolutely unintelligible to strangers, he having to carry a pad and write his communications, and even his most intimate friends could not always understand him. Immediately the appliance was placed in position he began to talk so plainly as to be easily understood, and in a week's time he spoke so well that, in the course of half an hour's conversation with a body of dentists and physicians, no one asked him to repeat.

INFILTRATION-ANESTHESIA IN DENTISTRY.

BY C. H. FRINK, D.D.S., LAKE CITY, FLA.

THE dental profession has been slow to approve of the use of local anesthetics for many reasons, chiefly among these the danger of systemic poisoning from cocain, which nearly all contain in a greater or less degree.

It has been shown that the injection of simple water into the tissues, producing artificial edema, will induce local anesthesia. Dr. C. L Schleich, an eminent surgeon of Germany, after a series of experiments found that a solution of three grains each of cocain muriate and sodium chlorid, two-fifths of a grain of morphia muriate, and three fluidounces of sterilized distilled water, had very marked anesthetic properties. This anesthetic is now being used with great success in all parts of the globe. It may be observed that this solution contains only one grain of cocain to the ounce of water, and, were it necessary, an ounce could be injected into the human system with impunity.

In using this anesthetic for the extraction of teeth, it is necessary to force as much of the fluid as possible in the adjacent tissues. In order to do this the needle should be inserted several times, keeping it, in most cases, parallel with the long axis of the tooth. This will allow deeper penetration of the needle and permit a greater quantity of the fluid being injected. A small crystal of cocain, applied to the point of the first insertion of the needle, will render the injection of the solution painless. The effect of this is to produce a small circular area of a whitish appearance when thoroughly anesthetized. Each subsequent insertion should not be made outside of the anesthetized portion or wheal formed by the previous injection. When a sufficient quantity is injected, the tissue should assume a whitish appearance. The operation may be performed immediately.

The possible hypnotic effect of such a procedure before extraction is beneficial, as many patients feel much safer and are in a much better condition to undergo the operation when they observe some step has been taken to lessen the pain.

This subject should be investigated by every conscientious dentist. We owe it to our patients that every method not endangering life be used for the alleviation of human suffering.

◆

CORRESPONDENCE.

A PLAN FOR A NATIONAL DENTAL ASSOCIATION, DIVIDED INTO FOUR CO-ORDINATE DISTRICT BRANCHES.

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—The expediency of uniting the various general dental organizations of the United States into one organic whole has been frequently proposed and discussed, but nothing so far has been accomplished as the outcome of these discussions. While the profession feels the need of one representative general organization which shall be truly national and comprehensive, embracing the whole territory of our great domain, no plan has yet been proposed which seemed to fulfill the requirements. Such an organization must embrace the whole Union, it must be representative, and it must be brought within the reach of all members of the profession.

It has been conclusively demonstrated that it is impossible to convene in one great gathering at any one point at one time, and have a fair representative attendance. The attempt has always been unsuccessful, and must forever remain so, on account of the magnificent distances in our great country and the time, fatigue, and expense involved in long trips. This will always prevent a large representative attendance from all sections in any one single meeting. This is observed in the meetings of the American Dental Association, in which the largest representation is always local.

Therefore the plan herewith proposed is designed with a view of obviating this one great difficulty, and yet to bring large gatherings within reach of all sections, that all the profession of all parts of our land may have the advantages of large gatherings and the valuable material they attract.

The plan is to have district organizations which shall be federated under one central organization, but which shall each meet within the limits of their respective districts at times so arranged that they shall not conflict with one another. By being confined within limited regions they can be readily reached by the profession of that region, and thereby insure larger attendance. Each branch will be representative of its own district,—delegates being elected to it from the various state and local societies, as in the American Dental Association at present. Membership in one would be membership in all the other branches, so that a member could attend the meetings of any or all branches and be equally at home, like the members of a secret order, the district branches being comparable to the separate lodge organizations.

The district organizations would be united under a central organization and be co-ordinate parts of one organic whole. Each one will be in touch with every other one and with the whole profession through the central organization. This would consist of a president and a council, say of two members from each district branch. This council would be supreme as regards matters of government, but would not have power to legislate on questions of general importance without the consent of the branches. However, the division of power could be arranged between them as might be for the best interests of harmony and simplicity. That, as well as other matters of detail, could be adjusted without difficulty.

The president of the central organization (or alliance, or association, or federation, as the name might be chosen) would be president of the whole organization. He should be a man of age in practice, who had served his profession well; of distinguished abilities, accomplishments, and achievements, who would be elevated to the position as a distinguishing mark of honor by the profession, one whom the profession "would delight to honor."

The presidents of the branches would be vice-presidents of the whole organization, and with the other necessary officers would be elected by the branches. They would be entitled to preside at any branch meeting, when present and invited to do so by the regular president of that branch. The general president, however, would have precedence at any branch meeting.

The whole United States can best be divided into four districts, the eastern, southern, central, and western, each having its representative organization or branch, which would meet within its borders. There would be, first, the eastern (or Atlantic) district; second, the southern (or Gulf) district; third, the central (or Mississippi) district, and fourth, the western (or Pacific) district. It is noticeable that in three of these district organizations already exist for the convenience of the profession of those districts, which would seem to indorse the feasibility of the plan. In the Atlantic region we have the present American Dental Association; in the Gulf region we have the Southern Association, and in the Pacific region we have the Pacific Coast Congress. These organizations are already complete, and would only need to accept the plan to become integral parts of the general whole. It would only remain for the profession of the Mississippi basin region to organize a branch to make the system complete.

The branch meetings should be held so as not to conflict with one another, at different seasons of the year. Thus, the Eastern branch could meet in summer (as the American Dental Association does now), the Southern in winter, the Central and Western in spring and autumn, as they might mutually arrange. There would thus be a branch meeting in each quarter of the year, and a member could attend all of the meetings, in which he would be entitled to all rights and privileges.

This is the plan in general, the details of which could be worked out to accommodate the general convenience, taking care always to have it as simple as possible and not encumber it with too great a load of the machinery of government.

That there is an increasing desire for larger general meetings, distributed so that they shall be within easy reach of the mass of the profession, is demonstrated by the disposition manifested to organize "joint meetings," "interstate meetings," "dental congresses," etc., which shall attract larger numbers and thus make it worth while for men of talent to present their best work. The usefulness of the old-fashioned state societies is passing away, and their decline is due to the decline of the old-fashioned essay and clinic. The rambling essay of the amateur writer of former days is giving way to the highly wrought monograph of the specialist. The small attendance at the state meetings does not offer sufficient inducement for the specialist to present his best efforts, but he reserves them for the larger meetings. Hence, the latter are organized to attract him, and he in turn attracts a larger attendance, so that they react on each other. The state organizations must still be continued, however, for the business of the profession, dental legislation, etc., so that they cannot be dispensed with entirely. But the days of their scientific usefulness are numbered, for they cannot compete with the larger meetings in attracting the attendance and the specialists who make those meetings beneficial. A. H. THOMPSON, D.D.S.

TOPEKA, KANSAS.

PROCEEDINGS OF SOCIETIES.

NEW YORK ODONTOLOGICAL SOCIETY.

A REGULAR meeting of the New York Odontological Society was held on Tuesday evening, April 21, 1896, at the New York Academy of Medicine, with the president, Dr. William Carr, in the chair.

The minutes of the previous meeting were read and approved.

REPORT OF THE CLINIC.

Dr. F. T. VAN WOERT. My clinic this afternoon consisted in anesthetizing the soft tissues for an operation in pyorrhea alveolaris. While I succeeded in the undertaking, I was not as expeditious as I might have been, had I had the proper electrode. The gentlemen who were present can tell you that there is no question but that the parts were absolutely dead to any feeling. I know this has been done before, but in a different way, with a different machine. The apparatus which I have here is one that I worked upon personally, and one which has been manufactured by an old firm of electro-therapeucians in this city, who have a world-wide reputation for this work. They have been very kind in helping me in this matter, and putting into my hands those things that help to make cataphoric medication in dentistry.

Some people have witnessed the operations in my office for anesthetizing pulps, etc., for which cataphoric medication is so noted at the present time. I became convinced some time ago that the introduction of an electric current into the tooth-structure, if from the street, was a dangerous thing, for the reason that the fluctuation is such that it cannot be relied upon. I immediately set to work to find a means of controlling the current, and that is what you see in the cabinet which is here. For me to explain it from the platform would be impossible, for there are so many details that it could not be done. From a practical and personal experience of some extent, I can say that this apparatus will do all that is claimed for it, and with precision, too. If you have several patients waiting, and have to stand with an electrode in your hand for even five minutes, it will seem a year to you ; but if you have a suitable electrode and leave it to the boy or girl in the office, you could go on with other matters, and get another patient ready for some other operation. For that purpose I devised a little electrode which is made of spring wire. There is a little shoe bent on the bottom. By placing cotton on it, saturated with whatever you wish to use in the medication, and the other end sprung taut, you have a perfect contact.

Here is another little device, the connection between which and the apparatus is of the same character, and just as sure. It is a formed spring with two little ears on it, which are placed through the eyes or rings which are on the electrode. That is one of a number of forms for that purpose. For cavities on the labial surface, I think the best electrode is the ordinary rubber-dam clamp. After the clamp is placed in position, and the cotton placed in position, this is simply sprung on the clamp. It gives as good results as any electrode I ever used. You can use it in almost all cases. To have an electrode that would suit all cases would be almost impossible, and to have a sufficient number of electrodes in connection with the clamps would complicate matters very much. If the patient will hold the electrode, all right ; but, with children especially, they are apt to let go of it. They do not drop it, but they break the connection by letting it sag. I have devised one that can be fastened on the wrist and tightened ; the connection is made in the same manner as the other.

Further than that, I have become thoroughly satisfied in my own mind, from the results which I have had, that in cases of acute pericementitis abscesses can be prevented with diluted tincture of iodin, by means of a little cup which is placed over the gum where the most inflammation is present. An application of from three to five minutes will relieve the pain, and in many cases it will entirely abort the trouble that was presenting itself. These cups can be made in any form that is necessary. In the soft tissues it is unnecessary to be so minute in the division of the current, because there is very little, if any, pain felt until the current gets beyond a reasonable amount. With the volt selector, the increase and decrease of current was too slow. It consumed more time than was practicable, and therefore I devised a cell selector. The number of volts thrown into the circuit is thrown into a rheostat which is like the valve of a steam engine,—the more you open it the more you get.

To overcome the difficulties and possibilities of spoiling a machine and depleting the batteries, there are attachments on it by which you can go from one button to another without dropping the amount of current, which causes pain. The moment you let go of one of those levers, you have wiped out all possibility of short-circuiting the batteries. Sometimes through failure to free the contacts of switches, so they will not short-circuit, they are left that way for two or three hours, and you deplete them so that you have no current when you want it ; but if they are recuperating when you are not using them, you have all the current you want, when you need it.

Dr. A. L. NORTHROP. Would Dr. Van Woert make the application, and leave it in the hands of an assistant?

Dr. VAN WOERT. I would certainly leave it in the hands of my son, who is nine or ten years old, without any hesitancy whatever, for the reason that I do not believe there is any possible chance of constitutional effects in the introduction of cocain in a cataphoric way. The direction in which the current goes controls the direction in which the medicament goes. All pathological and physiological tests that can be made for toxic effects of cocain prove that it is impossible to get it into the system in that way. The drug is absorbed in the direction in which the current flows.

Dr. NORTHROP. The principal idea of the question was this : In turning on the current, if it is turned on too rapidly, does it not cause pain? If it does, is not some care required? Can it be put in the hands of a novice to turn that current on *ad libitum?* As far as I know, different people and different temperaments require different forces of current. For some people the Wheeler instrument could be brought up to the highest number—forty—in four minutes, while for others you could not do it in less than fifteen minutes.

Dr. VAN WOERT. I would say that the apparatus which is here presented has a controller upon which a child can operate without any danger of causing pain, if the child has sufficient intelligence to stop when it is told to do so by the patient. If the person is so stupid that he will not stop when he is told, then it is not safe to trust that person with anything. But a child that can understand that much can run the controller without the least danger of causing pain, if the patient will warn him when the pain begins. The amount of current necessary for producing anesthesia is much less than I originally supposed, and much less than is generally supposed. The amount of seven to fifteen volts is all I use now. I formerly used thirty and forty, and thought I had to have it. I used to run the controller to the hundred mark to get the current I wanted.

Another thing I have learned by practice is the diffusing of the current through the tooth by means of tin or tin foil, or anything you wish to place over cotton, and not depend upon the conductibility of fluid. The fluid itself is a big factor in the matter. If the menstruum in which the cocain is put is a good conductor, you get your results with much less effort and time; on the other hand, if it is a bad conductor, you must increase your voltage until you get your results.

I have used common salt, which increases the conductibility sufficiently so that a very little turn upon the controller will give results that otherwise would take a long time. So far as the control of the current is concerned, when you have back of the rheostat or controller an absolute number of volts, you know what you will get; but if you have a voltage that varies like the street current, what can you do with it in the tooth? There is not a rheostat made that will stand it and not give a fluctuation. The tooth-structure has the highest resistance of any substance that I have yet found. You could use the current in the soft tissues without danger, but in tooth-structure the fractional part of a volt will often cause intense pain; if the current is cut down to a minimum amount, and that cut down by the controller, its use is perfectly safe in the hands of any operator who has ordinary intelligence.

Dr. WM. JARVIE. I move that the thanks of the society be tendered to Dr. Van Woert for this very beautiful and valuable apparatus for cataphoric medication.

Carried.

Dr. C. F. W. CADY. I presented a case here this afternoon which was one of anesthesia of the lower lip. There had been an abscess, and there was a fistulous opening on the lip. I treated it in the regular way by an old formula of Dr. Atkinson's, composed of carbolic acid and iodin. I pumped it through the canals of the tooth and the fistulous opening, and stopped the discharge, and afterward filled the tooth with gutta-percha. After all the discharge was stopped and the tooth was cured, the patient had a total loss of sensation of the teeth in front of the first molar, which was the one treated, and also a loss of sensation of the lower lip of the size of a half-dollar. The loss of sensation has lasted six weeks, and now feeling begins to return; no doubt in the course of time it will return entirely.

The paper of the evening was then read by Dr. S. G. PERRY, of New York City, entitled "Mistakes."*

Discussion.

Dr. CROUSE. A thing that struck me forcibly in what Dr. Perry said was how one practitioner can treat another—praise him and at the same time damn him with a shake of his head. This is the only kind of individual that I do not think I can get even with. I like the fellow who comes up openboard and speaks his mind. You know where to find him when you want him. I have had things in journals that I thought would wake every one up, and I wondered why I did not hear from them. Afterward I would meet people and ask them what they thought about the subject, and they would say they had not had time to read the journal yet. I would like to take a vote of the intelligent audience here, and find out how many have looked in the last journals to see what is in them. I am sure two-thirds of them have not read them. If that be true, what is the fault? I have thought of cutting down the *Digest* one-half, putting in just the substance. That would be better than thirty-six or forty-eight pages of a journal that is not read. The subject is an old hobby of mine. I predicted twenty years ago that the journal that would be the best would be the one that could be read in twenty minutes, and give just the substance.

Dr. McQUILLEN. Dr. Perry's paper is so full of the milk of human kindness that if we could only follow out in our professional lives the suggestions he makes, we ought to be very much happier and be better all around.

Dr. JARVIE. Dr. Walker has just received the following dispatch from Philadelphia:

> "Hail the man who never made a mistake, for he has done nothing.
> BONWILL."

It would be yet another mistake if I should attempt to discuss this paper, for it is not a paper to discuss. It is a paper to thoroughly enjoy, and to take as it is intended. It is a paper the axioms of which we can take to heart,—the little mistakes that are made in our lives, in our work, in our offices, in our social life, and all the way through, and I, for one, have enjoyed listening to it exceedingly. I want to pay this tribute to Dr. Perry and his paper, without attempting to discuss it.

A vote of thanks was tendered to Dr. Perry for his interesting paper.

Adjournment.

JOHN I. HART, D.D.S.,
Editor Odontological Society.

---

* For the paper in full, see page 537 of the current number.

AMERICAN MEDICAL ASSOCIATION—SECTION ON DENTAL AND ORAL SURGERY.

(Continued from page 507.)

FIRST DAY—*Afternoon Session* (Continued).

DR. S. W. FOSTER, of Atlanta, read a paper, of which the following is an abstract, entitled—

DISEASES OF THE ORAL CAVITY A POTENT FACTOR IN GENERAL DISEASE.

The oral cavity, in its broad range of function, exceeds in importance any other organ of the human body. These include articulation, vocalization, prehension, mastication, insalivation, deglutition, etc. Its employment is constant from the induction of life to the last breath of old age. Its functions are so important that any interfering pathological condition would have manifest effect upon the other organs. This is shown plainly in the disorders accompanying first dentition. When the development of the tooth proceeds more rapidly than the overlying tissues are absorbed, we have local inflammation, the secretions become much increased, pressure on the nervous and vascular supply involves the whole system. The child becomes wakeful, restless, and fretful, refuses nourishment ; the alimentary canal becomes more active, diarrhea follows, and if relief is not given, relaxation of the vital forces follows, and we have nausea, vomiting, convulsions, paralysis, and not infrequently death. Statistics show that more deaths occur during the period of first dentition than during any other like period during life. When we consider the anatomy of the trigeminus nerve, which supplies the teeth, we recognize the possible reflex effects upon remote organs. This is a compound nerve, varied in its functions,—a nerve of special sense, common sensation, and motion ; the great sensitive nerve of the head and the face, the motor nerve of mastication, its lingual branch being the nerve of the special sense of taste. It sends important branches to the ear and eye, anastomosing with many other nerves. It is not strange, then, that we have remote lesions originating from disorders affecting this nerve. Neuralgia and earache are among the most common.

The essayist exhibited an unerupted impacted central incisor which had been extracted from the mouth of a lady aged about twenty-five. The lady had suffered from neuralgia for several years, despite the attentions of the best physicians available. She had tried change of climate, and taken every other means suggested for relief, but to no avail. Finally her dentist, noticing the absent tooth, made a careful examination and located it, with cutting-edge pointing upward and almost protruding into the nasal cavity. He removed the tooth by making an incision at the union of the lip with the gum, removing the overlying osseous tissue with burs and chisels. With the healing of the wound the neuralgia entirely disappeared, and the general health was greatly improved.

He also described a case in which the left superior second molar interlocked and impacted the third molar, the coronal surface of which was deflected backward toward the tuberosity of the jaw. The history of the case was of a dull, heavy, gnawing pain about the region of the malar bones, which finally terminated in slight paralysis of the face, from which no relief could be found. The second molar having developed quite a large cavity, she applied to have it extracted. The operator was much surprised at bringing with it the unerupted third molar. Within a few weeks after this operation the paralytic condition disappeared. We believe these cases, as well as many others, are the result of reflex irritation produced by dental disorders.

We frequently have recorded cases of amaurosis as the result of inflamed or dead pulps, or chronic catarrhal trouble produced by a diseased tooth, first producing an inflammatory condition of the antrum and spreading from thence through the nares and various sinuses.

In examining the mouths of many patients suffering with that hydra-headed monster, dyspepsia, it has proven the exception when the masticating powers had not been destroyed from one-third to five-sixths of their capacity. We know that the balling of food and throwing it upon the stomach day after day will produce dyspepsia, gastritis, etc. ; and we must admit that if the inability to properly masticate the food is not the direct cause of this dreadful disease, it certainly goes hand in hand with it. Lower the vitality and you invite disease. The oral cavity is the commencement of the digestive tract,—the ante-chamber to man's vegetative life,—and in this respect it is anticipatory to the stomach. Therefore it is reasonable to suppose that any lack of hygienic or any pathological condition that causes a deficiency of quantity or quality of the fluids which are first met with when food first enters the mouth is a hindrance of nutrition, and undoubtedly makes its impression on the stomach.

Often when a patient presents herself for treatment we notice the bloom of life has left her cheeks, her eye has not the sparkle it once displayed, she is anemic, debilitated, and despondency and melancholy brood over her. Her physician not being able to locate the trouble in any special organ, pronounces it a case of "nervous debility" or "giving down of the vital forces," and the use of tonics, with change of residence, is advised. A careful examination of the oral cavity would possibly reveal a seething pit of filth, decayed and broken-down teeth, suppurating sinuses, contaminating the air of respiration, vitiating the oral fluids, poisoning nutrition, and consequently lowering the vital forces and breaking down the general health. This is not imaginary, but the real condition of the mouths of many of our patients, nor is it a wonder that the system breaks down.

It is rare that we see a consumptive in whom we do not find a typical case of pyorrhea, or at least pus exuding from around the necks of the teeth, and it seems that the breathing into the lungs the effluvia from these suppurating sinuses of the mouth might produce this fatal disease.

This leads to the question, What should the co-operation of the physician and the dentist be? or should the dentist know more of medicine, or the physician know more of dentistry? My conclusion is that no medical college should be without a chair on the principles and practice of dentistry, and our dental schools should, as a rule, teach more of general medicine and surgery.

Discussion.

Dr. W. J. YOUNGER, of San Francisco, said there was no doubt of the effect of pyorrhea upon the general health, and described cases of patients who were seriously affected in general health and who, when their teeth had been properly cleansed and their mouths put in good condition, had recovered without the aid of systemic treatment.

Dr. FRANK HOLLAND, of Atlanta, spoke of a case, a man who had injured an incisor by a fall, some time after being attacked by the grip ; an inflammation developed about the root of this tooth which extended into the antrum, causing suppuration and a flow of pus from the nose. His physician treated him for nasal trouble, but could not afford him relief. Dr. Holland extracted the tooth and drained out the antral cavity, and treated it through the opening made by the tooth. Under this treatment health was soon restored.

Dr. J. S. THOMPSON described a patient, a clergyman, who had to give up preaching on account of sore throat, and who, failing to find relief from the local physicians at his home, came to Atlanta to consult a specialist in throat-diseases. He was referred to Dr. Thompson for an examination of his teeth. The right upper third molar was missing, and upon careful search it was found impacted above the second molar. Both teeth were necessarily extracted, and the throat trouble was cured.

Dr. C.V. ROSSER, of Atlanta, agreed with the essayist that diseased conditions of the teeth were often factors in disease of the general system, and described the case of a lady who had been a patient of his. She lived in the country, and had been under the care of physicians for about seven years. Her digestion was apparently so poor that no food was properly assimilated, and her strength was so far gone that when she came to his office she could scarcely walk. Upon examination of her teeth he found six in the upper jaw badly decayed, and with fistulous openings from which pus would discharge upon pressure. This condition explained why she could not digest her food, as the teeth could not do their part in preparing it for digestion. The broken-down teeth were removed, and the necrosed portion of the alveolus burred out. When she returned to his office two weeks later, she had so changed in appearance that Dr. Rosser failed to recognize her. Her health was so far recovered that she had gained six pounds in the two weeks, and her strength and spirits were improved in even greater proportion. Since then her recovery has gone on till her health is entirely satisfactory.

Another case was being treated for throat trouble, which he found on examination was caused by pus from an abscessed tooth which had burrowed back through the soft part of the palate and discharged into the throat, causing very serious disturbance to the throat and digestive organs. With proper treatment the abscess was cured and health restored.

Dr. F. P. GALE, of Atlanta, mentioned a case of a patient who had long been treated for catarrh, but he found an abscess of a central incisor, which was treated, and the catarrh ceased. Another case of a woman who had been confined to her bed for several years suffering with symptoms of general physical debility, and was apparently almost a dying woman when he was called to examine her mouth. He found all the teeth affected with pyorrhea ; removed all, and made her a full upper and lower set. The result was, the poisonous pus being no longer taken into her system and the ability to masticate food restored to her, she regained her health and strength entirely.

Dr. E. S. TALBOT, of Chicago, said most of the medical colleges now have chairs on the diseases of the teeth and the oral cavity, and advised dentists, in cases of medical colleges that have not such, to make an effort to have them established. He did not think antral troubles were often caused by diseased teeth. The researches of Dr. Fletcher, of Cincinnati, who examined more than one thousand antra in the collections of the different colleges and museums, showed very few openings from the teeth into the antrum.

He agreed with the essayist upon the effect of an unhealthy state of the mouth upon the general health. Many patients are sent him by his medical friends to have the mouth put in good condition, and frequently the health is restored when this is done. In many cases the low state which favors consumption is caused by pyorrhea and other troubles in the mouth. He has one patient who has tuberculosis, who comes to him two or three times a year to have pyorrhea treated. The effect is always to build up his strength for the time, but the condition returns.

In every case of a fistulous opening about the face, he insists upon an examination of the teeth, the removal of roots, and the treatment of all carious teeth ; also with all cases of neuralgia.

Dr. FOSTER, in closing the discussion, said his main purpose was to bring the importance of this subject before physicians, many of whom do not realize the bad effect diseased teeth have upon the general system.

The subject was passed, and Dr. H. D. WILSON read a paper on "Professional Congeniality," advocating a closer friendly and professional relation between dentists and physicians ; that they work together with mutual trust and respect, thus being enabled better to serve those whose well being often depends upon the combined help of these two great branches of the healing art, whose services practically all mankind, in the civilized world at least, are sure to need. His concluding paragraph was : "Let me close with this admonition. As we are one in organization, let us be one in our daily intercourse, and ere the twentieth century shall dawn we will crystallize into one true motive, and the world will feel and recognize us as an honorable brotherhood that will inspire universal confidence. For he that lives for self alone stagnates his heart with its dying virtues, and exposes to the world the rottenness of a base and ignoble life."

There was no discussion, and the Section adjourned to meet the next morning.

SECOND DAY—*Morning Session.*

Dr. W. E. WALKER, of Pass Christian, Miss., read a paper of which the following is an abstract:

MOVEMENTS OF THE MANDIBULAR CONDYLES AND DENTAL ARTICULATION.

(*Paper No. 2.*)

This paper is designated as "No. 2," being a continuation of the line of thought and investigation indicated in the paper by the present writer, entitled, "The Glenoid Fossa; the Movements of the Mandible; the Cusps of the Teeth," read before the Southern Dental Association in November, 1895, and published in the DENTAL COSMOS, January, 1896, pp. 34–43.

You will pardon some repetition and quotation, as there are probably many present who are not familiar with that paper.

Up to that time I had not been able to find mention of the facts which I had observed that, in the movements of mastication, the mandibular condyle moves "not only forward, but also downward, causing the ramus to drop, in the anterior and lateral excursions of the mandible," and that the condyle on the side toward which the jaw is advancing, in the lateral excursions, does not merely "rotate on its axis," otherwise "remaining stationary," as we are taught, but that it also moves both upward and backward,—very slightly, it is true, in many subjects, and not at all in some, but quite considerably in others.

My desire for information on these points led me to enlist the services of men who have access to libraries such as are not within my reach, but with all the assistance they could render me I had been unable to learn of any description of the temporo-mandibular articulation and the movements of the mandible corresponding with my observations.

I had therefore concluded that the observations were original, one of our closest observers and most thorough students confirming me in this conclusion by the expression of the opinion that I had "made an important discovery with respect to the functioning of the mechanism of mastication."

The manuscript of my paper having been placed in the hands of Dr. E. C. Kirk, as editor of the DENTAL COSMOS, with the request that he would kindly refer me to anything within his knowledge bearing upon these points, he some weeks later directed my attention to an article published in the *Boston Medical and Surgical Journal*, July 4, 1889,—viz, the report, by Dr. Charles E. Luce, of the Harvard Dental School, of certain original investigations in the movements of the lower jaw, conducted in the physiological laboratory of the Harvard Medical School, under the direction of Professor Henry P. Bowditch.

I will not detain you with the story of my own original inductive methods of study, and the experiments by which I had satisfied myself of the inaccuracy of the descriptions given of the temporo-mandibular articulation and the movements of the mandible; suffice it to say that having obtained a copy of that report, it was very gratifying to me to learn that these distinguished investigators, working by widely different methods from my own, had reached the conclusion to which I had been forced,—viz, that "certain errors exist in all descriptions of this articulation given by the eminent anatomists and physiologists," a partial explanation of some of the inaccuracies being assigned by Dr. Luce to "the fact that anatomists have made too much use of the cadaver to demonstrate the actions of the articulations, whereas it may be that the contraction of the various muscles, co-operating with and antagonizing each other, is the important factor in determining the exact movements of the jaw."

Another cause is probably to be found in the failure, in studying the temporo-mandibular articulation, to make due allowance, as I pointed out in my first paper, for the fact that "in the dried skull the glenoid fossa is emptied of its intra-articular fibro-cartilage, its double synovial sacs, and its membranes, forming altogether a thickness of some two or three millimeters, which space will be found, in the dried skull, between the upper surface of the condyle and the roof of the glenoid fossa," making it impossible to reproduce the normal play of the condyle in its socket, and consequently the true movement of the mandible.

The published report of the Harvard investigations antedates my own studies by several years, but their work was quite unknown to me until pointed out by Dr. Kirk, and does not appear to have attracted the attention of the dental world, with the following single exception, as far as I have been able to learn.

Dr. Kirk at the same time directed my attention to the Transactions of the Ninth International Medical Congress (Berlin), in which appears an illustrated paper by Dr. Schwarze, of Leipzig, giving an account of his attempts to improve upon Dr. Bonwill's anatomical articulator, based upon the study of these Harvard investigations.

Dr. Schwarze failed, however, to grasp the idea of the relations existing between the line traced by the condyle movement and the plans of occlusion and articulation and the plans of the alveolar process, and therefore missed the essential point,—viz, that to secure normal articulation in each individual case, it is necessary to reproduce in the articulator the exact angle formed by the intersection of these lines in the subject.

While, in his experimental modifications of the Bonwill articulator, Dr. Schwarze used a movable joint, it was all haphazard work. Not having recognized the existence of a definite angle, varying widely in different individuals,* he naturally made no effort to secure any definite angle in the articulator, and finally abandoned his attempted improvements upon the Bonwill articulator as failures, with the remark that the nearer he approached nature the farther he found himself from practical results. (I quote from memory, not having the Transactions at hand.)

Dr. Bonwill had indeed said to me at the meeting in Atlanta, after the reading of my paper, "that a former German student of his had made certain attempts at improvements upon his articulator, which he had abandoned as vain and fruitless," promising also to send me the drawings of those variations. He failed to do this, however, until after the publication of my paper, and in the mean time having, through the kindness of Dr. Kirk, obtained a copy of the Berlin Medical Congress Transactions, I was already familiar with the Schwarze modifications of the Bonwill articulator, and readily recognized the cause of his failures, inasmuch as he had missed "the connecting link" between the Harvard investigations and a perfect articulator.

---

* See Dental Cosmos, January, 1896, p. 38.

In the words of Dr. Luce, "the first requisite in the study of jaw movements is to move the jaw," and the second "to get a permanent record of the movements."

In the Harvard school investigation, the photographic method of recording the movement of the jaw was employed. A light framework was constructed, reaching around the face from the lower incisors (to which it was securely fastened) nearly to the ear. By adjustable devices bright beads were placed directly opposite the condyle, gonion and symphysis. The subject being placed in strong sunlight, a profile view was photographed, the bright spot reflected from the bead during the motion of the jaw, in opening and closing the mouth, being continually photographed, and recorded on the negative as a line, giving the actual movement of the place upon the jaw to which the bead was opposed.

As recorded by this device, the mouth being opened to its greatest extent, the movement of the condyle is traced "as a curved line with the concavity upward," the beginning of which, or that portion traced in the "short openings" of the movements of mastication, being, as I was gratified to see, in the "forward and downward" direction that I had observed, and, as shown by a study of the illustrations, at about the same incline to the facial line that I had noted as the average in normal articulation.

The illustrations, it is to be presumed, are given as a correct reproduction of the photographs, with the relative proportion observed between the width of the face and the extent of mouth opening. Assuming this to be the case, the subjects opened the mouth much wider than I have been able to obtain. I have measured the mouth opening compared with the width of the head sighted from the front, and find in my practice that the mouth opening is less than one-third of the width of the head, while in the illustration showing a front view it is more than one-half as great.

These tracings are spoken of by Dr. Luce as being "interesting to dentists, inasmuch as they show what has to be contended against in taking the bite preparatory to the insertion of an artificial substitute." But, to my mind, a far greater interest attaches to the corelation of the line traced by the condyle in the movements of the mandible, and the facial line.

After the reception of the report of Dr. Luce, in order to more thoroughly study the subject, and to confirm the results of these different methods of observation, I constructed an apparatus somewhat similar to the one used in the Harvard Laboratory, and obtained the photographs which I present for your inspection. They are from the untouched negatives, the white spots showing the location of the "beads," and the lines made by this change of position in the movements of the mandible.

Fig. 1 shows the right side, with the extreme mouth opening, showing the distance traversed by the bead at the symphysis, one at the region of the first molar, and one over the condyle.

Fig. 2 is the left side, showing the same points.

Fig. 3 is the right side, showing the distance traversed by the three beads in moving the mandible from right cusp contact to the occlusion, and over to the left cusp contact. The ink mark which was placed on the side of the face before photographing shows where the bead rested in the occlusion, the trace forward being the left lateral movement, and back of it the tracing of the right lateral movement.

Fig. 4 is the left side, showing the tracing of the beads in moving from occlusion to incisive contact.

Fig. 5 is a front view, showing the movement of the bead from right cusp contact to occlusion.

To further verify these observations in another series of experiments, I replaced the "bright beads" by a small point of pencil-lead, which traced the movement of the condyle on a sheet of stiff paper held against the side of the face, with the edge parallel with the facial line.

By this method the movements in a large number of cases can be traced, in the time required to photograph and develop the negative of a single case.

In edentulous cases I fastened the appliance to the handle of an "impression-tray," in which I used Teague's impression compound, additionally securing it by clamping to the mandible when necessary.

By this method I obtained tracings from a large number of individuals, but failed in a single instance to obtain so great a curve, or, proportionately to the size of the illustration, so long a line as thrown in the Luce report. I should say, however, that his curve was apparently derived from the movement of the condyle when the mouth was opened to a very extreme degree.

There is a certain definite co-relation between the morphology of the morsal surfaces of the teeth, and the angles made by the intersection of the functional portion of the condyle path* with the facial line, which I call the condylo-facial angle ; also the angle made by the intersection of the condyle-path with the plane of occlusion (or the alveolar plane in edentulous subjects), the condylo-occlusal, or the condylo-alveolar angle, as the case may be.

In the paper before referred to,† I gave the conclusions which I had deduced from my experiments in the articulation of the models of natural teeth, and the great variations found in the condylo-occlusal angle of different subjects, ranging, as I there stated, from twenty-two and one-half degrees in one case to forty-five degrees in another, those being the greatest extremes noted up to that time. More extended observation, however, has shown an even greater range.

---

* By which I mean that short straight portion of the condyle, tracing forward and downward, made in the movements of mastication extended till it intersects the facial line.

† See DENTAL COSMOS, January, 1896.

FIG. 1.

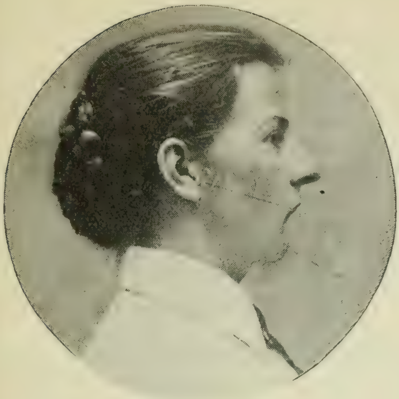


FIG. 2.

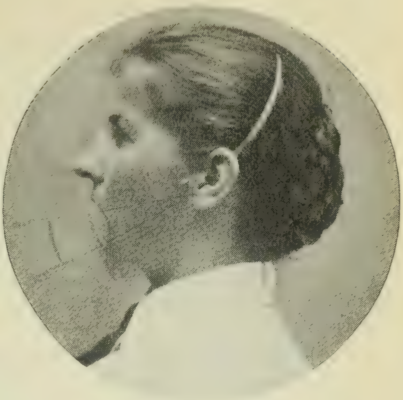


FIG. 3.

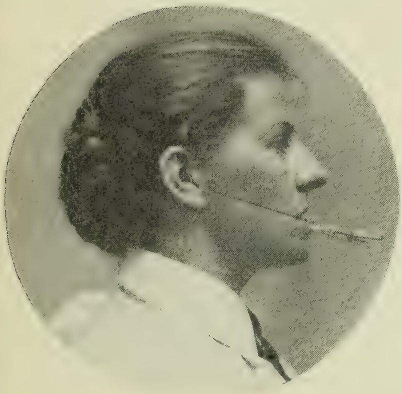


FIG. 4.

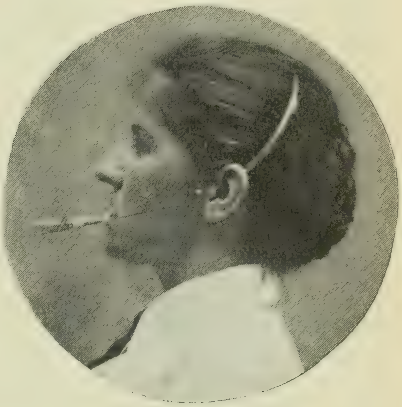
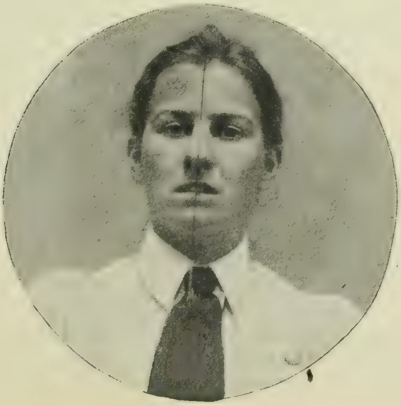


FIG. 5.



Having proven to my own satisfaction the fact of this variation in the condylo-occlusal or condylo-alveolar angle, I constructed an articulator with an adjustable angle to reproduce these variations with degree gauges to record the measurement of the angle, which varies not only in different subjects, but also very considerably in the movements of the two condyles of many individuals. I have also constructed an apparatus which I have called a Facial Clinometer. This device registers the direction of the condyle path and of the plane of occlusion (or the alveolar plane in edentulous subjects), as compared with the facial line, and measures in degrees the angles formed by the intersection of these lines; also the "classic facial angle," the mandibula-facial angle, etc. It also measures in millimeters the distance that one condyle moves forward with the synchronous backward movement of the other condyle in the function of mastication.

I quote from Holder's Human Osteology: "In masticating we can readily feel that one condyle advances toward the anterior margin of the glenoid cavity, while the other recedes to the posterior." The authorities are not in accord on this point, but the clinometer shows it very plainly. It is true that in some subjects the condyle does not move back at all, while in others it recedes considerably, and often one condyle recedes more than the other.

The ratio between the forward movement of one condyle and the synchronous backward movement of the other varies greatly in different individuals, and even in the same individual the ratio often varies in the left lateral movement as compared with the right. This distance measurement is registered in millimeters by the clinometer, and likewise on the articulator, where it serves to correspondingly regulate the distance at which to place the bite-correcting fulcrum-screws from the condyles of the articulator. The importance of being able to recognize the extent to which, in any given case, one condyle recedes as the other advances, and of being enabled to utilize the observation, is illustrated by the diagram on the opposite page.

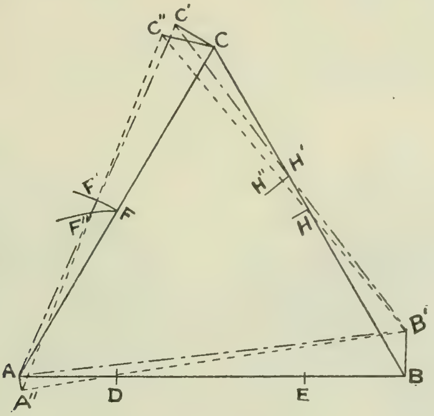
The mandible, as we know, is based on the equilateral triangle, the sides measuring four inches. In the diagram A and B represent the condyles, C the point between the central incisors. If we imagine that the mandible is thrown to the left, and that the left condyle A does not recede, B, the condyle of the left side, takes the position B′, while C, the median line of the incisors, travels to C′. In the molar region F travels to F′ on the left, and H to H′ on the right. But in a case in which the right condyle B advances the same distance as before, while the left condyle A recedes one-third of that distance, moving to A″, we will find that the entire triangle acts as though turning on the fulcrum D. C, instead of moving to C′, will reach C″, while F will have moved to F″, and H to H″.

In constructing a set of teeth for a subject in whom, by reason of the condyle receding on the guiding side, the fulcrum is at D as shown, instead of at A, if by reason of the construction of the articulator the fulcrum is immovably fixed at A, instead of being movable to suit the case, we would find the articulation at fault to the extent of the difference between the points F′ and F″, H′ and H″, C′ and

C″, respectively, causing inevitable interference of the cusps, necessitating either the sacrifice of the cusps or the reconstruction of the set.

There are two reasons why teeth molded upon plates should have cusps. Dr. Bonwill points out that it is necessary in order that there may be a reciprocating or balancing articulation,—that is, that when the incisors are brought in contact the molars will also touch to balance, and that when the buccal cusps of one side are brought in contact for the purpose of grinding food, we may have a balancing contact on the opposite side, the upper lingual cusps resting upon the lower buccal. This "balancing articulation" I have illustrated on pages 39 and 40 of the January, 1896, DENTAL COSMOS.

Dr. G. V. Black, in his recent experiments with the dynamometer, has shown that the subject wearing plates cannot exert nearly so much force as those having the natural teeth. He also found, in studying the physical characteristics of foods, that it requires very much less force to comminute food with a cusped crusher than when placed between plane surfaces. This is the second reason why cusps are necessary to artificial teeth, and, in fact, even more essential to teeth inserted upon plates than to the natural teeth. It is much to be regretted, therefore, that so many of the unfortunate people who have to wear plates which deprive them of a portion of the crushing power, should also, from lack of an adjustable articulator, be deprived of cusps upon the artificial teeth, thus still further diminishing their masticating force.



In my work thus far I have used only a heavy, clumsy working model of the clinometer, made of brass in order that it might be altered as found necessary in the test of actual use. I had hoped to be able to show it to you in its perfected form, made of aluminum, but am disappointed, as I have had difficulty in finding an expert aluminum worker.

Fig. 6, however, represents the head-piece of the clinometer in position (the jaw piece, which is secured to the lower jaw to indicate the movement of the condyle, being here omitted). An adjustable frame surrounds the head, resting upon it at the points *A* and *B*. A slender, dependent piece, *C*, not very clearly shown in the photograph except on the forehead and just at the base of the nose, indicates the facial line ; the piece *D* set parallel with *C* by the set-screw *E*, and held rigidly in position by the brace *G*, carries the adjustable transverse piece *H*, the degree gauge *I* registering the angle formed at the intersection of *D* and *H*. In this position it serves to register the condylo-facial angle when *H* is placed parallel with the condyle-path indicated by the jaw piece when the latter is in position and the jaw moved as heretofore described, a point over the condyle traveling freely in the slot of the loosely adjusted transverse piece *H*, the latter being fixed by a set-screw when its direction has been determined by the movement of the condyle pointer. The position of the transverse piece *H* can also be changed so that it will register the "classic facial angle," the maxillo-facial angle, etc. The same dependent piece *D*, when placed in front of the face supported by the projection *J* and the brace *K*, and placed parallel with the facial line indicator *C*, and using the same transverse *H* and degree gauge *I*, serves to register various other angles.

FIG. 6.

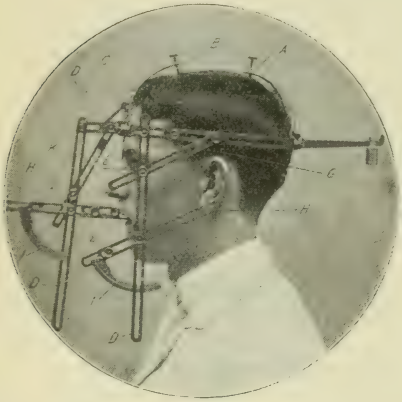


FIG. 7.

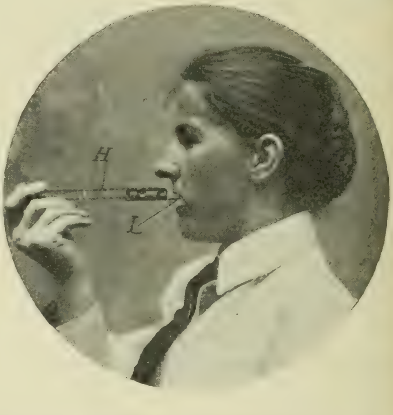


Fig. 7 shows a modification of the transverse *H*, which enters the mouth and indicates the plane of occlusion—not from the incisive edges and cusps of the upper teeth with the mouth open, but the morsal edge of the lower incisors and the summit of the cusps of the lower first molar when in complete closure. To obtain this plane, points are affixed to the device which enter the sulcus of the upper molars to exactly the depth of the overlap of the incisors when the teeth are in occlusion. This function of the transverse *H* is also seen in Fig. 6, where it serves by other slight modifications to measure the plane of occlusion as described, also the plane of articulation, the alveolar plane, etc.

The angles and measurements thus recorded by the facial clinometer not only fully confirm the deductions from my experiments with models of the natural teeth, but show an even greater range of variation in the angles in question, not only between different individuals, but in the movements of the two condyles of the same person.

It has been said, "In the domain of organic life there is rarely perfect symmetrical correspondence in the two halves." This last condition was therefore anticipated, but not to the remarkable extent demonstrated by actual measurement.

I will cite two most remarkable illustrations of this great variation.

One a gentleman of sixty years, for whom I made a full upper and lower set. He had never worn plates before. The clinometer recorded the condylo-alveolar angle as one degree on one side and ten degrees on the other, with which angles in the articulator a reciprocating articulation was obtained. This case has the lowest angle I have ever encountered, but it is largely due to the fact that his molars were lost some years ago, while a pair of bicuspids and the incisors were only removed a few months ago. Thus the alveolar process is greatly absorbed at the rear, but scarcely any at the anterior portion. When absorption takes place in front, the angles will undoubtedly become greater.

The second case is that of a lady seventy years of age. She has natural teeth below, but has worn an artificial set above for over twenty years, having had different sets made in New York and elsewhere, but never with satisfaction, not having been able to bite.

The condylo-alveolar angle in this case was twenty-two degrees on one side and forty-four degrees on the other. The variation was so great that I doubted the correctness of the record, and concluded that I had failed to get the indicator exactly over the condyle. Not wishing to trouble the patient with a repetition of the measurements, I, in placing the case in the articulator, made a compromise, taking five degrees from one side and adding five degrees to the other side. But I found it impossible to get a reciprocating articulation until I had restored the angles to the clinometer record. This was a peculiarly difficult case, not only because of the extreme angles, but because the lower molars were worn by contact with porcelain teeth above, and the lower incisors having been relieved of all work were very long, and the patient unwilling to have them shortened.

The articulators devised by Drs. W. G. A. Bonwill, E. T. Starr, W. W. Westmoreland, and more recently by R. H. Antes, have, it is true, both a lateral and a protrusive movement, but inasmuch as they fail to reproduce the drop of the ramus due to this hitherto unrecognized combined forward and downward movement of the condyle, they do not reproduce the true movement of the mandible, and therefore do not permit the normal articulation of the cusps of models of the natural teeth. Consequently they cannot be relied upon to produce a correct articulation of artificial substitutes.

The physiological articulator, with its adjustable angle, its degree and millimeter gauges for recording the measurements taken by its adjunct, the facial clinometer, will probably appear too complex to some, especially as compared with the dental articulators heretofore in use, which, with few exceptions, have been mere occluders. But to those who desire to give their patients the best results possible, and who are not satisfied with anything short of scientific accuracy, the study of the mandibular movements as measured and recorded by the clinometer, and reproduced by the adjustable articulator, will be found not only instructive and interesting, but also of great practical value in their applications.

As I said in my first paper, "The movement of the condyles constitutes an important factor in many departments of our work, as in its bearings upon the articulation of the teeth, in the study of the cusps of the natural teeth with a view to bettering the articulation, either in orthodontia or in the treatment of the disease commonly known as pyorrhea alveolaris or Riggs's disease, in the shaping of artificial cusps, whether in fillings, crown-work, bridge-work, or plate-work ; in the treatment of diseases of the facial muscles, of the glenoid fossa, or of plastic adhesions, etc."

Discussion.

Dr. E. S. TALBOT said the paper was a very valuable one, and showed deep and patient thought and careful work on the part of the author. For many years he had been studying the jaws and had observed the conditions described by Dr. Walker, but had not thought of applying the knowledge to the construction of artificial dentures. He had observed cases where one side of the jaw varied from one to one and a half inches from the other, and it would be perfectly absurd to supply for such a patient an artificial denture made according to the directions of Dr. Bonwill. His practice is mostly with cases of correcting irregularities, consequently his patients are young people, not candidates for artificial teeth.

Much could be said of the equilateral triangle and its bearing on the subject of artificial teeth. Dr. Bonwill has never tackled an opponent on that subject. He brings forward a mathematical proposition and applies the jaws to that proposition, asserting that it is perfect and the Almighty made man perfect, and therefore the jaws coincide with his proposition.

The fact is, very few men are perfect in any part or feature ; from various known and unknown causes a large proportion show signs, perfectly evident, of degeneracy, and in very many cases the degeneracy has upset the equilateral-triangle theory. In fact, it is doubtful whether Dr. Walker can find a single jaw with all of the lines of the equilateral triangle perfect. In visiting Dr. Bonwill the last summer, the jaws of animals, of which he has a considerable collection, were examined, and Dr. Talbot was convinced that the cuspid teeth of animals, usually supposed to be primarily for the purpose of holding their prey, served as a most important function as a guide in closing the jaws. Beasts of prey, as we know, have much more lateral movement of the jaws than have men, and no matter how the jaws may close on the prey, the cusps of these come together and guide the jaws down to the natural position. It is easily seen that if the jaws came together while they were laterally extended apart, the prey would not be secured.

Dr. B. H. CATCHING asked if the scientific idea of the method of articulating the teeth originated with Dr. Walker.

Dr. WALKER said that it had undoubtedly originated with Dr. Bonwill, who deserved the greatest praise for his studies of the subject.

Dr. G. V. I. BROWN, of Duluth, Minn., said that he thought the proper articulation of artificial teeth would be a cause of relief from pyorrhea in many cases.

Dr. J. S. THOMPSON, of Atlanta, spoke of the importance of saving the natural depth of the cusps in artificial dentures, thus giving the patient the benefit of increased masticating power.

Dr. CATCHING said the teeth as furnished by the manufacturers were very crude as to the cusps, and he wondered that they did not conform more to the natural teeth.

Dr. WALKER said that The S. S. White Dental Manufacturing Company had promised to at least consider some models that he was to submit to them, and as soon as he was satisfied with them he would send them on. The great majority of molars and bicuspids as now made were much too small.

Dr. R. R. ANDREWS, of Cambridge, Mass., hoped that there would be changes made. Had much difficulty in finding lower incisors suitable for patients past middle age. These teeth as manufactured are too perfect and more suitable for young people, who rarely need them.

Dr. C. V. ROSSER said it was the fault of the dentist; that the manufacturers would furnish such teeth as the dentist demanded, and if they would buy only small, white, perfect teeth the manufacturers would not make any others. Very rarely do we find patients who will be content except with small, white, pretty teeth, no matter how much more suitable darker and less perfect ones would be. He had, however, recently made a set for a patient at her own request, with the laterals overlapping and the first bicuspid on the left side broken out to correspond with the state of the natural teeth as they had been for several years. He considered this the most artistic set he had ever made. There can be no question of the great diversity in the shape of the jaws. Not only are there differences, but rarely are the two sides of a jaw just alike. He thinks this arises frequently from intermarriage between different races.

Dr. WALKER said no doubt the dentists need educating in regard to the best shapes for artificial teeth. The S. S. White Company had told him that some years ago they had put teeth on the market with extra long cusps, but could find no demand for them; so they discontinued making them.

(To be continued.)

UNION MEETING OF THE MARYLAND STATE DENTAL ASSOCIATION AND THE WASHINGTON CITY DENTAL SOCIETY.

THE annual union meeting of the Maryland State Dental Association and the Washington City Dental Society was held in the Columbian Dental College, in Washington, May 8 and 9, 1896.

FIRST DAY—*Morning Session.*

After an address of welcome by Dr. WM. M. HUNT, president of the Washington Society, and an address on the part of the Maryland Association by its president, Dr. W. W. DUNBRACCO, the following paper was read by Dr. L. ASHLEY FAUGHT, of Philadelphia:

SOME NOTES ON THE USE OF GOLD AS A FILLING-MATERIAL.

Every dentist in full practice must by the pressure of previous training, and in no small measure by environment, have brought his methods used in the service of his clientele into some order and system ; in other words, other things being equal, to use a given filling-material in a given place.

Leaving out of the question the care of the teeth of very young children and of those mouths of all ages in which the teeth are below medium in quality, he will find that where sufficient remuneration can be obtained his system includes in no small measure the use of gold as a filling-material. No matter what his ability to use this material, or what his convictions regarding its utility, he must of necessity look upon its use as a requirement, and on his results with pride and satisfaction, or on the efforts of others with admiration and approval. His inspection of his own work and close observation of that of others will undoubtedly deprecate the ravages and dilapidation caused by its demonstrated misuse ; but, notwithstanding such outraged feelings, he is brought time and again to look upon it as a most valuable filling-material, and one whose place in his system has never been, nor cannot at present be satisfactorily taken by any other.

The proposition as here enunciated being accepted as demonstrated truth, the best service to be obtained from gold will be in proportion as one has clear ideas regarding its use.

Prominent in the forming of my own ideas, which it is the province of this paper to state, are two essential facts :

First, that work has been done with it which has proven a joy forever ; second, that work has been done with it which has ingloriously failed.

Query—Why one result? Why the other?—Conditions being apparently equal.

Answer—Difference—first, in method of preparation of cavity ; second, in method of insertion of gold ; third, in method of finishing fillings ; fourth, in method of cleanliness by patient—oral hygiene.

The elaboration of the ideas involved in these four replies involves the whole subject of gold filling, and I wish right here to disclaim any intention of entering upon their consideration so extensively as to pose as a teacher of the subject. A few points regarding each, which have impressed me as salient, are all that I shall treat.

The preparation of cavities in teeth to receive gold does not admit of frail cavity-walls, does not admit of overhanging walls, does not admit of rough or irregular edges. I have particularly found that good, substantial walls with nicely polished edges are essential to success. I also advise, in approximal fillings, to cut back far enough to expose the point of junction between the gold and the tooth-substance so as to admit of proper cleansing. In approximal fillings especially securing the point of contact between the two teeth in gold.

Regarding the insertion of gold into such cavities, I stand here as an advocate of the good old-fashioned method of hand-pressure ; the motto ever before me being, that the great essential is not rocky solidity, but adaptation to the walls of the cavity with sufficient condensation to prevent disintegration. Mallets may be rapid, but time is nothing and the result everything. I verily believe that many fillings fail from the effort with mallets to obtain unnecessary solidity. He who has cultivated strength in his fingers with that peculiar motion known to a hand-worker, and the drop of the wrist, can properly impact gold without mechanical adjuncts, which only too frequently comminute the marginal edges of the cavity. Small pieces and small points, with not too much annealing, are the other requisites to success. Use, but be cautious in your use of matrices, and always contour your work.

The proper finishing of fillings I have found to require that the cavity should be filled to a little, a very little, over flush, and never so full as to be excessive, and then a thorough and persistent use of burnishers to the large exclusion, or very cautious use, of stones and files.

My last consideration is not the least in importance, but lies in the hands of the patient. The best work is liable to failure if the patient is careless in cleanliness. Having done all, every effort should be made to impress the need of this great adjunct upon the minds of those to whom the jewels are intrusted.

Discussion.

Dr. H. C. THOMPSON, of Washington, was in entire agreement with the paper. One of the great mistakes made in the insertion of gold fillings was the use of unnecessary force; all that is required is sufficient to expel the air and bring the particles of gold into actual contact. The Herbst method of filling proves this, and if it was practicable in all fillings it would be a perfect method. The use of a mallet and large instruments in packing gold is detrimental, because the excess of force used changes the nature of the gold by raising heat.

Dr. H. B. NOBLE thought the point should be emphasized that it was not the density of the filling, but its adaptation to the walls of the cavity which made it effective. Fillings made in the days of soft gold were not so thoroughly condensed as those we make now with cohesive gold, but they stayed in close contact with the cavity walls and were more permanent than many of the cohesive gold fillings of to-day. Indeed, many dentists were returning to the use of soft gold and to the combination of soft and cohesive gold in the same filling. The wedging principle was of the greatest utility with soft gold, but to attempt its use with cohesive gold was dangerous. Both kinds of gold have their uses; and the dentist who uses both, keeping their different characteristics and possibilities clear in his mind, will do the most satisfactory work.

Dr. C. C. HARRIS, of Washington, thought it was an error to think that in filling approximal cavities we must always have the gold at the point of contact, and that we cannot fill with gold except where we have strong walls. He described cases of incisors which he had filled fourteen years ago that had such frail walls that the fillings could be seen through the enamel, and yet they preserved them to this day. Such cases he fills with Abbey's soft foil, keeping close contact with the walls of the cavity and finishing with cohesive gold, filling with hand-pressure almost entirely. In the front walls of teeth he would not cut, no matter how frail, if he possibly could avoid it. In back teeth he cuts away frail walls, as it is not so desirable to save them, and they are more liable to be broken down in mastication.

Dr. B. HOLLY SMITH had been thinking a good deal recently of the conducting properties of fillings, and whether it would not be good practice to avoid condensing the fillings so as to avoid irritation from this property. When we put ourselves in the position of the patient we sometimes get new light on the practice of dentistry, and he had been suffering the tortures of the damned because of a very beautiful filling which at last had to be removed. He did not believe cohesive gold could be successfully worked with hand-pressure. If it is used, it is generally for the purpose of building up contours to restore the shape of the tooth, and must be built up solid enough to resist strain and pressure. To do this we must get perfect cohesion, and this cannot be got with hand-pressure, but we must use the stroke of the mallet.

Dr. W. A. MILLS said that cohesive gold should be used in its appropriate place, but for certain teeth soft gold was much better, and it should be the object of the dentist to select his material to best fill the case. Because we cannot contour with soft gold, is no reason that it should not be used to fill cavities. Cohesive gold becomes so thoroughly condensed in a cavity that it conducts the heat to a greater degree than soft gold will, and thus causes trouble. The best use of cohesive gold is to finish fillings the main part of which is of soft gold.

Dr. FAUGHT particularly appreciated the remarks of Dr. Harris as to the difference in the way of treating front and back teeth. In filling the latter class of teeth it was not well to try to save walls that might afterward break down and cause a failure of the operation ; it is better to cut away a little too far rather than take this risk.

Discussion closed, and Dr. W. A. MILLS, of Baltimore, read the following paper :

DERMOID CYSTS *versus* MIGRATED TEETH.

On page 412, vol. iii, of "American System of Dentistry," edited by Litch, we find as a part of an essay on "Anomalies of the Teeth and Maxillæ," by S. H. Guilford, D.D.S., the following article, under the title, "Migrated Teeth":

"Instances of teeth found far away from the alveolar arch in unusual positions are rare, although such are recorded. When thus found they are generally encysted. Dr. Bolles says the wisdom-teeth are most frequently encysted, and next in order of frequency come the cuspids. Dr. Sayre relates a case where three molar teeth were separately ejected through the meatus auditorius externus of a little girl under his care.

"Ovarian cysts containing teeth and hair are sometimes met with, and are generally regarded as the result of involution.

"The most remarkable case of this kind within the writer's knowledge was one presented at the meeting of the American Dental Association, Niagara Falls, August, 1886.

"The specimen shown consisted of an irregular osseous mass, inclosing about twelve teeth, part permanent and part deciduous, but all so fully developed and normal in character as to be readily distinguishable, although mingled in much confusion. Attached to some dermoid tissue, overlying part of the bony mass, was a tress of hair fully an inch in diameter and fifteen or eighteen long. Most singularly, this cyst was removed from an unmarried woman, about twenty-four years of age, and a virgin."

To designate the teeth found in the ovarian cyst and those ejected through the meatus auditorius externus migrated teeth, as Dr. Guilford claims, is incorrect, and such a statement published in one of our best text-books is very misleading, especially so to students.

That teeth do migrate,—that is, the tooth-germ from which they are developed,—every practitioner of any experience knows, but we have always understood that the term migrated teeth meant normal teeth found out of their proper positions, but not having traveled any farther away from their usual places than the maxillæ and associated parts, *encapsuled* teeth not excepted. (We have one specimen where both superior lateral incisors are together on the right side.) That we are correct as to the term migrated teeth we have the written authority of three of the most noted surgeons in the United States confirming our definition. The teeth mentioned by Dr. Guilford cannot be so defined,* for they were a part of the contents of teratoid† tumors, of the dermoid‡ cyst order, and consequently were in no way or manner connected with the dental systems or dental arrangements of either of the subjects. They were the remains of suppressed or blighted fetuses, produced by the process of *inclusion.*

Teeth are found not only in dermoid cysts of the ovaries, but in dermoid cysts of the brain and many other parts of the body.

Dr. Guilford says, "Most singularly, this cyst was removed from an unmarried woman and a virgin." We cannot understand why there should be anything very singular about the case on account of the subject being a virgin, for surgeons meet with many such cases. We know personally of a similar case, the subject being the daughter of a woman who had given birth to twins on several occasions. We know of another where a similar cyst, as to contents, was removed from between the shoulder-blades of a man (unmarried) aged twenty-eight. Sex has nothing to do with these conditions. Dermoid cysts of the ovaries in some cases have contained so many fetal parts that they have been mistaken for cases of ovarian pregnancy, the victims being accused of immorality, although innocent of any such charge.

The following questions were sent to two of the most prominent surgeons in the United States, with the request to answer and return: Would you consider teeth found in a dermoid cyst of the ovary migrated teeth? Would you consider teeth ejected through the meatus auditorius externus migrated teeth? They both sent replies, No.

Dr. Senn, of Chicago, another prominent surgeon, and author of Senn's text-book on Tumors, in a personal communication to us, says, "The difference between migrated or displaced teeth and teeth found in dermoid cysts, in any locality, is that the former are perfect in structure, while the latter lack full development."

Dr. Roswell Park writes to us in reply, "Normal teeth are never found apart from the jaws." He also says, "Teeth found in ovarian tumor before mentioned were not migrated teeth."

---

* We would term them fetal teeth, dermoid teeth, or teratoid teeth.

† Monster.

‡ So named by Lebert, because the cyst-wall resembles the external skin.

These authorities, to our mind, settle the question fully, but in order to explain how we arrived at our own conclusions we will endeavor to give more light on the subject by giving a brief detail of the causation of tumors* in general,—more especially those of the teratoid order.

Man, all of the lower animals, and the vegetable kingdom are subject to tumors of various kinds. Through the investigation of the two latter much information has been gained as aids in the study of the former.

"Every tumor is the product of tissue-proliferation of a congenital or post natal matrix of embryonic cells, aroused into activity by a general or local physiological stimulation, or by congenital or acquired abnormal conditions in its immediate environment.

"Tumor-cells always correspond in type to the embryonic cells from which they are derived. The essential tumor-matrix may be composed of embryonic cells, the offspring of mature cells, which for some reason have failed to undergo transformation into tissues of a higher type, and which may remain latent for an indefinite period of time, to become, under the influence of either hereditary or acquired exciting causes, the essential starting-point of a tumor.

"The capacity of tissue-proliferation of the cells of which the matrix is composed does not exceed that of the cells of the corresponding normal tissues. For instance, a dislocated tooth-germ will produce a tooth not larger than a normal tooth, etc." (Senn.)

In other words, during the development of the cells in the embryo, each cell is limited in its function to the part or organ to which it belongs, and only produces its kind and no other.

This is the unchangeable law. No change from one type of cell to another ever takes place. To make it plainer, hair-cells make hair, skin-cells make skin, and nothing else, etc. The same law applies in the growth of tumors. All epithelial tumors have their origin in a matrix of epiblastic or hypoblastic embryonic layers, and all tumors of the connective-tissue order spring from a matrix of the mesoblastic embryonic layers.

Teratomata (teratoid tumors) differ from all other tumors in structure. While others spring from only one embryonal layer, the teratoids are derived from two or all of the germinal layers. Hence, they are composed of *organs* or *whole systems* of organs, which do not normally belong at the place where they are found. They are all of congenital origin, and are never post-natal; that is, the possessor is born with the essential tumor-matrix, and it is not developed after birth.

These tumors are developed in the embryo by errors of growth or displacement of tissues by inclusion; and, although in an abnormal situation, they grow with their proper function the same as though normally placed; or, as in cases of twin pregnancy, the epiblastic tissue of one fetus grows more rapidly than the other, pinches it, or includes it in part or *en masse*. We shall have more to say on this subject later.

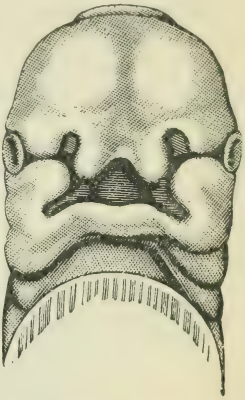
---

* Authorities consulted, Senn, Ashhurst, Jr., Tiffany, Sutton, Schäfer, Stimson, and Park.

Dermoid cysts of the complex order of teratomata—the class to which the cases cited by Dr. Guilford belong—are most frequently found in the parts of the body where during the development of the embryo the different germinal layers meet and blend.

For a partial illustration we give a representation of the head of a five-weeks' old fetus. (See Fig. 1.) In the central portion of the face is an opening from which five fissures radiate. "The upper pair are the orbito-nasal; the two lower fissures are termed mandibular, and the fifth, not shown in the figure, the intermandibular fissure. The median fold projecting into the opening from above is the fronto-nasal process, which ultimately forms the nose. As it develops, a rounded prominence, known as the globular process, forms at each angle, and gives rise to a portion of the ala of the nose and the corresponding premaxillæ. These globular processes fuse together in the middle line to form the central piece, or philtrum, of the upper lip. Eventually the sides of the fronto-nasal plate coalesce superficially with the maxillary processes in such a way as to leave a cleft on each side, which becomes the orbit, the line of union being permanently indicated in the adult by the naso-facial sulcus or groove, and indicated still more deeply by the lachrymal duct, which is a persistent portion of the original orbito-nasal fissure. The union of the fronto-nasal plate with the maxillary processes completes the nose, cheeks, and upper lip." (Sutton.)

FIG. 1.



From the foregoing description of the development of the face we can easily comprehend why dermoid cysts may appear either by coalescence or inclusion anywhere along the lines of the fissures. The external ear in the embryo is formed by the coalescence of a number of tubercles; from this we can understand how the teeth mentioned by Dr. Guilford as having been ejected through the meatus auditorius externus of a little girl came from a dermoid cyst opened by a process of suppuration. (See Fig. 2.)

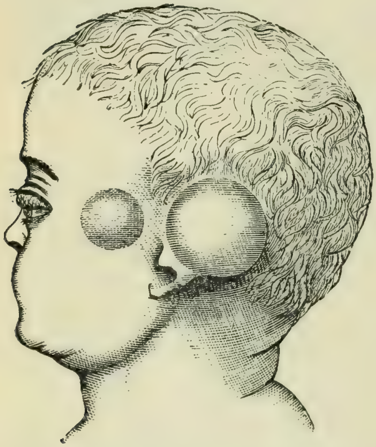
A tumor just the reverse of the dermoid cyst is a composite odontoma (tooth-tumor). While the dermoid cyst may contain heterotopic tissues, such as hair, brain, mucous membranes, and teeth, etc., which are derived from all normal embryonal cells and can be separated, the composite odontoma is the product of one or more abnormal tooth-germs which bear no resemblance in shape or structure to normal teeth, but is a fused, conglomerate mass of enamel, cementum, and dentine, all of the elements of tooth-structure and inseparable. It is believed that these tumors have often been mistaken for exostoses of the antrum Highmorianum.

"Teeth found in dermoid cysts vary from one to several hundred; they are never perfect in structure, are loosely inserted in imperfect alveoli, and are generally surrounded by tufts of hair." (Senn.)

"A tress of hair has been found (in a dermoid cyst) which measured over five feet in length." (Maundé.) "Maas succeeded in producing dermoid cysts artificially by the implantation of fetal tissues.'' (Senn.) Two embryos sometimes originate in the same blastoderm, or so close together they may fuse and produce what was known in the days of Hippocrates as a monster, but, thanks to scientific investigation, through its aid the mystery has been solved, and no longer are these erratic conditions considered the offspring of man and beast, or the curses of Divine Providence, but strange freaks of nature.

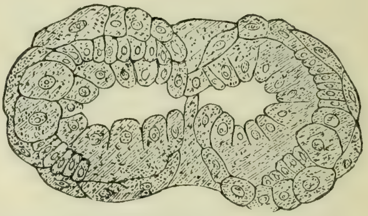
Man does not stand alone in this particular, for the lower animals, and the vegetable kingdom also, are subject to the same deviations, as in the case of the four-leaf clover. In the following figures we will endeavor to make it as plain as possible how these peculiar conditions are produced. After the segmentation of the vitelline spheres has progressed so far that they become so abundant as to be closely crowded together, they adhere to each other by their edges and form a continuous organized membrane called the blastodermic membrane, which is composed of three layers, the epiblastic, the mesoblastic, and hypoblastic germinal layers, from which all the tissues which make up the body are produced. The same process ensues whether it be a fish, a bird, a reptile, or a man. (See Fig. 3, which represents a transverse section of a double embryo.)

FIG. 2.



Dermoid cysts of the auricle, and nevus of the palpebral conjunctiva. (Senn.)

FIG. 3.



A transverse section of double embryo. (Klienenberg.)

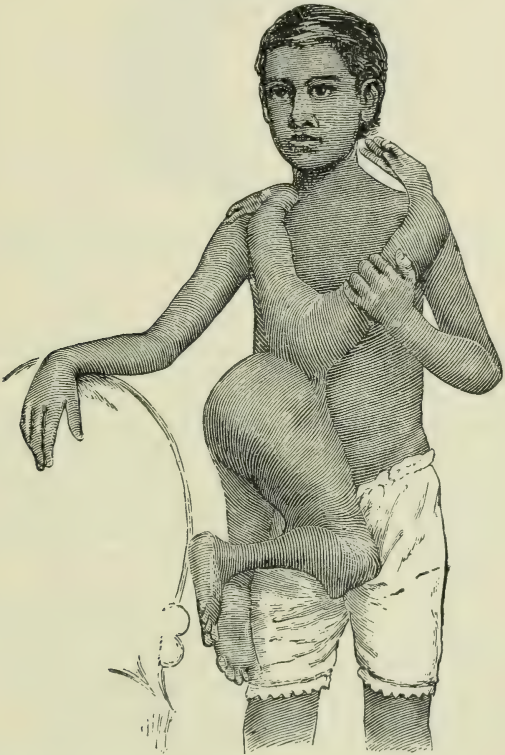
These embryos may develop equally and fuse at a given point, as we have known it to occur, as in the case of the Siamese twins; or, as before stated, one may grow more rapidly than the other, and while one is normally developed its mate may be blighted or suppressed to a more or less extent and becomes a mere appendix. In such cases the normal fetus is called an *autosite*, while its appendix is called a *parasite*. (See Fig. 4.) They are both always of the same sex.

When the blighting or suppressing process is carried to its greatest extent, we have one embryo to be perfectly developed, while the second embryo is so withered that it becomes a mere excrescence (See Fig. 5).

This is the condition when, by the process of inclusion of the excrescence, we have the origin of dermoid cysts containing hair, brain, mucous membrane, teeth, etc.

The highest order of teratomata is a *fœtus in fœto*—a fetus within a fetus. In the College of Physicians and Surgeons, London, Eng., is shown the most perfect specimen on record. A boy, aged fourteen and fully developed, was on post-mortem examination found to have inclosed in a sac or membrane in the abdominal cavity a fully developed fetus.

FIG. 4.



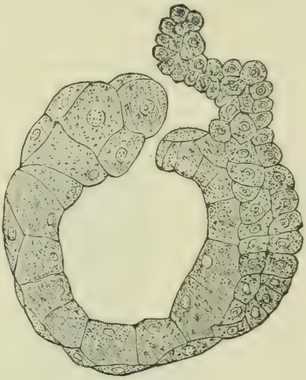
Laloo, a Hindoo, with a cardian parasite attached to the thorax. (Senn.)

The presence of tumors is often never known, for nature, being ever ready to do her part, strives to rid the system of all erratic conditions which may prove a source of danger, and finds some way of removing them ; as in cases of "vicarious" menstruation, when the flow of blood makes its exit by the mucous membranes of the mouth, etc., during the menstrual effort. Tumors she often removes by a process of absorption,* or so securely encysts them they remain latent, unless their activity is awakened by the multiplication of cells, producing an increase of volume without a corresponding physiological function,—independent of any inflammatory or microbic process,—making surgical interference necessary.

---

* Some surgeons claim that nature does succeed by this process ; others deny it.

FIG. 5.



A transverse section of double embryo, one of which is so blighted it appears only as an excrescence. (After Klienenberg.)

Discussion.

Dr. H. C. THOMPSON praised the paper as one that was the result of a great deal of study, and that was an object-lesson on an important subject which was little known by dentists. The fact is clearly shown that the dermoid tumors have their origin in the epiblasts, of which certain cells are undeveloped, and the dermoid teeth and other tissues contained in these cysts develop later in life, in positions far removed from those they would naturally occupy.

Dr. R. H. JONES, of Wilmington, Del., said he was very glad to have heard the paper, and thought it important that dentists should know more of the subject.

Dr. MILLS, closing the discussion, said these cysts were formed by the pinching together of certain portions of the epiblastic tissues, and the contents were the production of the germs so inclosed; thus hair-germs produce hair, teeth-germs produce teeth, etc. In ordinary tumors there is only one class of germs, but in dermoid cysts there are or may be several different kinds of germs, and so are produced hair, skin, teeth, or bones, or all of these tissues; in fact, some have produced a nearly complete organism.

The subject was passed, and Dr. D. E. WIBER, of Washington, read the following paper:

CYSTS: THEIR TREATMENT BY CURETTING.

By the term cyst is meant a collection of fluid, non-inflammatory in its nature, generally encompassed by a sac or bag. In contradistinction between cyst and cystic tumors I might add that a cyst contains within it nothing observable as a new growth, and all its fluid is inclosed in one sheath or sac; hence the terms "a cyst," and "cystic," convey lucid and distinct ideas of the nature of any tumor. A cyst, unless accidentally ruptured, is a permanent and usually a persistent swelling, with contents varying in character as well as consistence.

These forms of morbidity receive their distinctive names from the character of their fluid ; thus we have the serous, mucous, synovial, colloid, dermoid, sebaceous, seminal, milk, salivary, and sanguineous. Fortunately but few of the above named are discovered in the oral cavity. Again when classified they are denominated as exudative, new formation, retentive, congenital, and parasitic cysts.

The cysts most commonly found in the oral cavity are : ranula, alveolar, dentigerous, and mucoid. These are all of the epithelial variety, and are developed either from glands or remnants of encysted enamel-organs. There is another class known as inflammatory cysts, which follow the destructive work of an alveolar abscess.

The principal location or favorite site of a cyst is generally in the neighborhood of the incisors, bicuspids, and first molars of the superior maxilla. In the inferior maxilla their determination is at or near the first molar ; they appear either single or multiple.

Their origin is probably confined to the cancelli of the bone, and in many instances they are caused by irritation, either slight or severe. A cancellus being filled with fluid or semi-fluid, expands and produces absorption and obliteration of intimate cancelli, until a cyst of considerable size, ranging from a pin-head to a hazel-nut in dimensions, is formed. Many times this process is continued until the walls become membranous, and the macerated bone shows great gaps in its continuity. These spaces are filled with medullary or myxomatous tissue.

The external layer of a cyst is established by the gum, which bears the unmistakable signs of an inflammatory degeneration. This is followed in turn by the periosteum, composed of coarse interlacing bundles of fibrous connective tissue, with mucous inflammatory areas. The bony wall of the alveolus has become reduced. The outer wall of the socket remains apparently undisturbed, and the cancellous bone-tissue has been reduced to a scanty bone formation by the inflammatory process.

The diagnosis is comparatively easy if a few points are borne in mind while making your examination. This should be by inspection, palpation, percussion, and, when there is doubt, the aspirator may be required. By inspection notice the locality ; if near the first superior molar, differentiate between it and empyema. In empyema remember the catarrhal symptoms in the nasal cavity ; also, that by pressure the cyst may occupy the cavity of the antrum. When palpation is undertaken bear in mind that a cyst is more or less tense, hence, elasticity, fluctuation, or undulation become the objective symptoms to be relied upon. In percussion we have a very decided dull sound emitted. Soreness upon shock depends largely upon the inflammatory symptoms. The aspirator will always give satisfactory evidence of the nature of the growth, and can be depended on for a diagnosis of contents, aided by the microscope.

The history of the case will perplex rather than aid the attendant. The patient will complain of very little pain if there is but little inflammation present ; there may, however, be some headache, accompanied by a dimness of vision, more or less confined to the affected side. The growth of a cyst is usually slow: this point should be valuable in diagnosis; also that these growths are generally formed in individuals of poor constitution.

In the treatment of this condition by the method I am about to outline, the rigid practice of asepsis is urged; the operator's hands, the oral cavity as nearly as possible, and the instruments to be employed, should be thoroughly sterilized. The soft tissue adjacent to the field of operation, as well as the central point, should be locally anesthetized with cocain. The first incision is made over the greatest elevation of the protuberance, the length of the diameter of the swelling at its base; this incision is carried directly down to the bony tissue; the parts are dissected back and cleansed, all bleeding arrested by a hemostatic. A circular trephine, such as those manufactured by The S. S. White Co., mounted in an engine hand-piece, is then introduced, and a section of the bony process removed. The sac, or outer covering of the cyst, is now exposed and incised; the contents should be examined, and if other than fluid, all foreign substance is removed. The sac should be obliterated by means of a curette. I have used for this purpose the right, left, and straight spoon excavators, scraping the inside of the bony cavity thoroughly, using very little force in the operation. When satisfied that there remains none of the cyst covering, the wound is carefully washed out with warm water containing an antiseptic preparation. The cavity is then packed loosely with sterilized gauze, and the patient dismissed. At a subsequent visit, possibly the third day, remove the gauze, cleanse out the cavity, and allow the wound to heal by granulation. This will be accomplished inside of ten days.

In pursuing this method I have met with astonishing results in two cases. The operation was painless and radical, the obnoxious swelling was permanently reduced inside of a brief period, and the wound healed rapidly with no depression over the seat of disturbance.

Discussion.

Dr. B. Holly Smith asked the cause of these cysts.

Dr. Wiber said in the cases he treated the cysts resulted from abscesses, and the satisfactory result of his treatment encouraged him to describe it. The removal of the sac destroyed the possibility of the recurrence of the trouble.

Dr. Mills said the object of curetting was the thorough removal of the sac, and unless this was thoroughly curetted out and removed the trouble would return. In cancerous tissue the treatment would not be successful, for the giant-cells of cancerous tissue extend beyond the reach of the surgeon.

Dr. Smith said the question arises whether the cyst was not caused by something that might still remain after the cyst was removed; and though when the sac was broken up and removed the trouble would apparently be cured, still, if the cause remained, the same condition would return. The ragged end of the root of a tooth might be such a cause.

Dr. Wiber said in his cases the treatment seemed to be radical. The teeth were treated and filled. There had not been any absorption of the roots, as the cyst had not been of long standing, and there was no fistulous opening.

Afternoon Session.

The session was called to order at 4 P.M. Dr. L. C. F. HUGO read the following paper:

APPROXIMAL WORK—THE IMPORTANT FACTOR INVOLVED.

In his daily round of filling-operations probably the severest test to which the judgment, the skill, and the patience of the dentist may be subjected is the making of approximal fillings that will prove durable.

This is especially so in the bicuspids and molars. It is ordinarily an easy matter to produce comparatively permanent operations in morsal and small facial cavities, since in these places we usually treat plainly determinate structural defects, which, once attended to, are lastingly corrected, and fillings in the approximal surfaces of the incisors and cuspids are commonly quite durable. But so far as the buccal teeth are concerned, this kind of work has a precarious tenure. In the latter we must combat more or less fixed decay-favoring, extra-structural conditions. Further, owing to the frequently far-reaching character of the caries, and to the difficulties offered in the way of imperfect visual and manipulative access, operations here are not so well performed as in the other positions just mentioned. Add to this an unpardonable want of care as to the fate of the margins, and we need not wonder why the life of approximal work is of so short a duration.

As the object of this paper is merely to re-emphasize an old idea,—the necessity of free margins,—and to point out that upon this basis the two leading and wholly diverse methods in approximal work really agree, the writer must be pardoned if he is obliged to belabor some of the traditional "threshed straw."

The two methods of procedure as determining the shape of the interdental space,—or what is thereby connated, the form of approximal fillings,—are *permanent separation* and *contouring*.

Permanent separation—by which is meant the lateral reduction of cavity-walls so that they become free from contact with the adjoining tooth, or so that only cervical contact may ensue—was primarily practiced as a matter of expedience. By such management the cavity was simplified both as to form and accessibility; was lessened in depth; and it afforded firm walls against which to impact the filling-material. The making of a wide, self-cleansing interdental space had usually as a by-result the freeing of the margin. With the introduction of cohesive gold and its possibilities there was developed contouring,—by which is meant the forming of the fillings so that their outlines will restore the normal, or produce the typical, interdental space and contact. Again, the freeing of the margin was an incident rather than the primary object.

The great majority of separatists regard the vertical V as the proper shape of the interdental space after approximal operations have been performed; and in some cases, a horizontal < with the opening toward the tongue or toward the cheek, according to location and size of cavity. Others—a decreasing few—cling to the full or slightly modified U; still others cut the walls of the teeth parallel, leaving non-cervical shoulders, as in the U-space.

The advantages claimed for permanent separation are: Self-cleansing space, greater ease of operating, simpler fillings with less surface exposed to occlusive impact. The objections as urged by contourists are: Disfigurement of the tooth; an interdental space, which, if it remains open, will permit the frequently painful wedging of food-fibers against the gum; and if it is closed by the approximation of the teeth will transfer the contact point, line, or surface to the necks of the teeth, and in the case of parallel-wall space will cause the formation of a broad-contact surface with its attendant annoyances and danger; further, in cavities reaching to or under the gum the cervical margin may become covered.

In principle as exemplified by the work of its advocates, permanent separation in the buccal teeth is a violation of nature's order. In examining the normal arrangement of the human teeth, we note that they touch each other at or near the morsal surface; thus forming a V-space which opens more or less widely to the gum. This arrangement presents the largest possible chewing-surface, an almost continuous arch of enamel, which practically prevents the admission of food-fibers (the little that does enter causing no immediate inconvenience to the delicate interdental gum-points, since it passes into an enlarging space); the necks of the teeth so thinly protected against agents of decay stand far apart to admit of hygienic cleansing, natural and artificial.

Now, permanent separation inverts the V-space (I am speaking of the buccal teeth), breaks the continuity of the enamel-arch, and establishes the well-known objectionable conditions.

In the degree, however, that, as a rule, permanent separation is to be deprecated for the back teeth, it is highly to be commended, when properly made, for the front teeth. It is in the latter that the separatist has scored his greatest triumphs. It is here that some of his work has lasted fifty-five years and more. Why? Because the margins of his fillings were permanently secured from contact. In the case of the smaller cavities he placed a horizontal V at the backs of the teeth in such a way that, by leaving the incisal edges undisturbed, a permanent wide space was made. Even where he filed a U-space and the teeth gradually came in cervical touch with each other, his work has often proved to be an enduring monument to curative expedient. Here likewise the contact was beyond the margin, though at a more dangerous point.

To deny that, in the case of bicuspids and molars, permanent separation (or what was intended for such), by means of the V-space, has been successful, would be shutting our eyes to the truth. It will be found, however, that the teeth were above average quality, or that the separations made did not belie the term "permanent." But a short while ago I had the pleasure—I almost said the honor—of seeing a gold filling made by Dr. Eleazar Parmly over fifty-five years ago. It is still good, and will so remain even until Gabriel windeth his horn. In this instance the permanent separation—a generous V—has been maintained, leaving the margin free. In fairness, too, it must be admitted that the V-space has been successful for small cavities in short thick-necked teeth, in which case a broad contact-surface was reduced to a line contact. To secure, however, in the case of long, bell-crowned bicuspids and molars, the advantage just spoken of, too much tooth-substance would need to be sacrificed ; and contouring in such cases is not only self-suggesting, but imperative.

The Arthurian U-space, while it certainly was self-cleansing, and in that way counteracted the deleterious products of stagnation, exposed the dentine to such extent as to cause much discomfort. Yet teeth were saved by and despite such barbarous mutilation. It is needless to say why.

The kind of separation that is very narrow and leaves parallel walls—the cavity margins covered wholly or in part—is the very worst made, notably in the case of young persons' teeth. The latter tend to move against each other, the space almost disappears, and a broad contact-surface, or what is virtually such, is produced. Re-decay under these circumstances is unavoidable. Far preferable to such a space is an honest, wide V.

Contouring fillings was begun about 1855, by Drs. Dwinelle and Rich, who were followed by Drs. Varney, Webb, and a host of others. The advantages claimed for this method of practice are : That after the free cutting away of frail walls the normal outlines of the teeth are restored ; that the relative position of the latter is left undisturbed ; that the interdental gum-points receive the protection nature intended them to have ; and last, but not least, a free margin is made and *maintained*. The disadvantages are : More extensive, time-consuming, and ordinarily uncompensated hard work ; the soft-gold advocates' objection being that, in case gold is employed, the cohesive form and its exactions are the all-dominating feature.

That, so far as the buccal teeth are concerned, contour fillings realize the ideal of tooth-repair, is admitted by the majority of the dental profession. Perfect work, however, after this method, is so difficult of accomplishment that not many operators are equal to it. This being the case, very indifferent results in the way of ambitious contouring have been put forth, and discredit brought upon an excellent method.

In the average dental practice a rigorous carrying out of the contour method in its fullest sense, as applied to gold fillings, is almost impracticable. Such operations as have come from the hands of Drs. Webb and Shoemaker would not be paid for. A modification of the contour—that is, such a one as will embody the essential features—bold cutting back and effective knuckling to maintain free margins—is within the reach of any operator, and not beyond the patients' pocket and endurance. Three-fourths of the body of the filling may be made of soft gold,—the softer the better,—letting the final fourth constitute the knuckle built of cohesive gold.

Contouring at one time of its history was taken up as a fad. Excessive zeal in misapplication brought this method into utter disrepute. It was eagerly embraced as a field for the production of brilliant operations ; and so far as the outward, the mechanical execution is concerned, fine-looking work was produced. Much of it was, however, performed without judgment ; it was but too frequently a beautiful bay window to a crumbling log cabin, and the woeful results gave operators, really less capable of this "jewelers' work," striking argument against the whole system. As in many other affairs, the use of the thing had to be learned through its abuse.

Notwithstanding that the question as to which of the two methods —permanent separation or contouring—seems to have been decided in favor of the latter, examination of practical work shows but little contouring on principle. Since the advent of crowns, extensive contouring (with gold) has been relegated to the limbo of fancy accomplishments. I venture to say that, consequently, our profession as a whole do less skillful work in this kind of filling than was done twenty years ago.

In some respects it is well that crowning has taken the place of extensive restorations. Better a good crown than a laboriously-wrought, uncertain contour filling. Truly it is discouraging when we see operations based on acceptedly best principles, yet fall into inglorious ruin. It is an easy matter to give concrete form to the reflection that if our work, because of the bad quality of the teeth, is to fail despite our best efforts, we may as well be fair with the trusting patient, and put in a crown, or insert such fillings as will not in their failure involve so great a loss of time and money, and so much suffering as contouring with gold would necessitate. Expediency based upon considerations of physical endurance, quality of tooth-substance, small mouth, cranky patient, and question of cost, will decide whether or not large approximal cavities in bicuspids and molars shall be filled with gold. But though the question resolves itself into one of material, the method by which that material is given form should be such as will in the particular case place the work in the most favorable condition. The poorer the tooth, the greater the necessity for cutting well into sound substance, and likewise the greater the necessity for keeping the margins free. This, apart from other considerations, is the important factor in the success of work in approximal surfaces. However perfectly all the steps may have been taken,—preparation of cavity, both as to removal of decay and as to retention of plug; impactment of material and polish of filling, if the latter is so formed that in its approximal relation it fails to preserve its margins free from contact,—re-decay is in all but exceptionally fine teeth inevitable.

Dr. C. A. Brackett once expressed much in a few words when he said that the one thing needful for the durability of fillings is *changed conditions*. The separatist says, "I change the conditions by making wide self-cleansing spaces, thus relieving the teeth of a contact that was instrumental in bringing on decay." The contourist says, "I change the conditions by first making wide spaces, thus relieving the teeth of a contact that was instrumental in bringing on decay; and I keep them separated by knuckles of filling-material, so applied as to realize or to approximate to the typical interdental space and contact."

The difference in the practical results of the two methods is that, while both, purposely or undesignedly, make free margins, in contour fillings (except in small cavities of the front teeth) that desideratum is maintained, and in flat fillings it is frequently contravened by the subsequent changed positions of the teeth.

To summarize: I would say, abstracting from other considerations, the important factor in the reparative work on the approximal surfaces of teeth is free margins. To secure these, the surfaces of fillings (of appropriate size) in the oral teeth may be made *concave;* in the buccal teeth, *convex*. In other words, the interdental space of the front teeth, after insertion of fillings, may be a horizontal V opening toward the tongue; the space between the back teeth a vertical V opening toward the gum.

Discussion.

Dr. J. B. RICH said that as the originator of contour fillings and of the use of cohesive gold, he would be happy to say something on the subject. In addition to restoring the shape of the teeth, contour fillings serve an important purpose in preventing food from being crowded down upon the gum, and thus setting up an irritation; this is really the first reason for making such fillings. The first difficulty that was found was in the impossibility of making such fillings with soft foil, and at the time these fillings were first advocated there was no other foil known. He, however, had learned that by annealing, soft foil could be made cohesive. Contour fillings were found to fail at the cervical margin of the tooth because the force brought to bear against the portion brought in contact with the adjoining tooth would act on the enamel at the cervical margin in such a way as to split it off and thus begin the destruction of the filling. He overcame this difficulty by so shaping the cervical margin of the cavity that it would extend some way below the gum-margin, and be of such shape that the pressure would act against the solid wall of dentine rather than against the enamel. His contour fillings have a point of contact,—small, but sufficient to prevent food from crowding down.

Dr. FAUGHT said that this very reason, the necessity of so shaping a filling as to prevent the crowding of food against the gum, was what led him in a large measure to abandon the use of plastic fillings in favor of cohesive gold, which he considered the only proper material for such cases.

Dr. RICH said the reason cohesive gold was not used earlier was that it could not be procured until Watt's crystal gold was put upon the market. Until then by heating pure gold he could make it cohesive. There were many dentists at that time who made gold fillings, but they would not even try the cohesive gold; they wanted their gold to slip so it would go where they wanted it. Dr. Maynard, whose teeth the speaker filled when necessary, was so out of patience with his talk of cohesive gold that he declared it was all humbug, but still all the teeth in his mouth were filled with it. At length some of the teeth came out, and he presented them to Dr. Rich with a paper saying that he had filled them, and, he said, with old-fashioned soft gold. This made him laugh, for he knew they were filled with cohesive gold.

Dr. HUGO said that he had mentioned the painful wedging of food upon the gums, and his intention had been to compare the two ways of prevention, by separation and by contouring. The latter he considered the better, because teeth which were separated by cutting away down to the gum were liable to move, and so cover up the space, making the recurrence of decay probable, while if properly protected by contour fillings they would be supported in place and held in position.

Dr. Rich showed by a drawing that contour fillings, as he made them, would leave spaces below the contour. These spaces he taught his patients to keep clean by the use of a syringe, with which they were to be washed out, using alkaline waters every day.

Dr. H. C. Thompson asked Dr. Rich if he had any rule as to where the contact between the contoured filling and the adjoining tooth should come in contact.

Dr. Rich said it was a matter of judgment: sometimes two-thirds of the distance up from the gum toward the top of the tooth, but generally about half-way.

Dr. Thompson thought it was better to have the space below the filling, or rather between the point of contact and the gum, larger than that between the contact of the filling and the crown of the tooth, because then the food would be free where it was forced from the smaller into the larger space. Thus it would be easily removed or would be washed away by the movements of the fluids in the mouth, and would not remain to cause decay. He always sought to get the point of contact as far as possible from the gum, because there of course would always be some movement of the teeth, and this movement would allow the food to be crowded down.

Dr. B. Holly Smith said that the necessity of preserving the gum in a healthy condition was often overlooked in operations. The large contour fillings frequently irritated the margins of the gum, setting up inflammations which were a fruitful cause of caries. In health the gum preserves the tooth, but when the gums are broken down and injured they have an opposite effect.

Dr. Williams Donnally thought the paper in advocating contouring for back teeth and separation for the front ones, both for the purpose of preserving the gum-margins, struck the key-note of correct practice, and he heartily agreed with the essayist.

The discussion closed.

(To be continued.)

AMERICAN DENTAL ASSOCIATION.

(Concluded from page 516.)

Fourth Day—*Morning Session* (Continued).

Dr. Truman W. Brophy, Chicago, chairman of Section VII, Anatomy, Pathology, and Surgery, made a brief verbal report, announcing the papers to be read. Seventy-two articles on subjects embraced in the field of the Section had appeared in the journals during the year.

Dr. H. L. Ambler, Cleveland, O., read a brief paper describing the case of a young man of seventeen years, in whom the superior lateral incisors are missing, with no outward sign of their being imbedded in the jaw. The inferior denture has the proper number of teeth, but the central incisors are remarkably small, perhaps one-fourth the size they should be, although of good form and structure, firmly fixed in the alveolus, and the gingiva indicates well-formed roots about in proportion to the crowns. The family, who are very intelligent, are positive that the temporary teeth were shed and that these two small teeth erupted in their places. The temporary dentures were normal. The mother needs a left superior lateral incisor to complete her full denture; the only abnormality besides this that could be traced was that the grandmother retained the left superior temporary cuspid until she was fifty-three years of age, at which time a permanent cuspid of fair size and form was erupted which is still in place after a lapse of twenty-three years.

Dr. BROPHY read a paper describing "A New Method of Closing the Soft Palate," which embodied a means of overcoming the tendency of the sutures to cut out, by modification of the quill suture. Fig. 1 shows cleft of the soft palate, the fissure extending through the palatal plates of the palate bones and into the palatal plates of the maxillary bones. After the edges of the tissues are well freshened, four silk sutures are introduced by means of a needle curved after the fashion of a gynecologist's needle. These are substituted by rather strong silver sutures. Then lead plates, perforated with holes to correspond with the number of sutures, and shaped so as to extend from the anterior margin of the fissure back to the distal border of the soft palate, are placed upon the palate and bent to conform to its shape. The wire sutures are then passed through the holes, as shown in the drawing, and twisted together. Tension is thereby exerted upon the divided portions of the palate, and the edges approximated. When necessary, the bones along the border of the hard palate nearest the molar teeth may be divided with a strong scalpel or chisel, and then the lead plates are easily brought toward each other, together with the tissues they embrace. Sometimes the elevation of the soft parts, with the periosteum, will serve, and this can be accomplished with a bow-shaped periosteotome. After the edges have been approximated as shown in Fig. 2, fine silk sutures may be employed to hold them in close contact and secure immediate union.

FIG. 1.

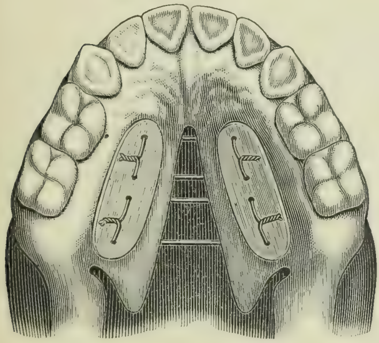
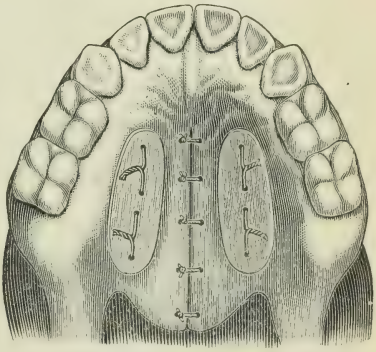


FIG. 2.



The lead plates prevent the cutting out of the sutures, as the pressure is upon the entire portion of the palate covered by them. They also serve as a splint, rendering the palate inflexible to a certain extent, suspending the vibrations, and putting the active muscles out of use until union of the cleft tissue may take place. Dr. Brophy had used the method in a sufficient number of cases to feel confident that better results in certain cases can be secured than by the use of sutures alone. The class of cases in which he recommends it are those in which the bones are well ossified and the deciduous teeth all erupted.

Dr. JOHN S. MARSHALL, Chicago, has used this method in his clinics at the American College of Dental Surgery, and he believes it one of the best we have.

Dr. BROPHY has performed the operation in this manner often enough to know that he has better success than when operating in any other way.

The Section was passed.

A paper, entitled "Evolution in Operative Dentistry from the Electro-Chemical Standpoint," by Dr. S. B. Palmer, of Syracuse, N. Y., was read by title under Section III. This paper, of which an abstract follows, was prepared to correct misconceptions of the ideas presented in the paper read before the association at its previous meeting, and to re-state the electro-chemical theory of caries. It had been a study of years to discover principles which might be so defined and formulated that young dentists who could manipulate filling-materials well might operate with an assurance and success not otherwise attained short of years of experience. There is no need of our young men waiting years to gain experience, when a few well-defined laws may be so applied that results of operations can be predetermined.

In filling, two conditions menace success : first, low grade of dentine ; second, indiscriminate selection of filling-materials, or defective manipulation. Normal dentine and grades higher require nothing more of a filling than the exclusion of liquid circulation, and no other material compares favorably with gold for this condition of dentine, which is not an electrolyte. The second condition embraces electrolysis, in that it includes a low grade of dentine, which is an electrolyte in proportion as it admits of fluid circulation. Gold fillings of this class cannot preserve teeth without the help of some other material to take the place of the mineral element lacking. Even perfect manipulation cannot prevent decay. Tin, which supplies this missing element, is softer than gold, is generally more easily adapted to the walls of the cavity, and an inexperienced operator would be more successful with it than with gold in filling normal dentine. In the lower grades the moisture in the dentine oxidizes the metal, the stannic oxid fills the tubuli and the rough surfaces of the dentine with an insoluble lining which does not stain dentine or enamel. This principle is important in making alloys for amalgams and in compound fillings where two metals are used in connection. As in galvanized iron, after the zinc has been dissolved almost out of sight, there remains in connection with the iron an alloy of zinc and iron ; so, when tin and gold are in contact, as in a compound filling, there is no separation at the joint, and the same is true of amalgam and gold, because atoms of gold form an alloy with the metal in contact with it, and that alloy is the solder at the joint. The two fillings are united, and the solder containing gold is finer than the tin or amalgam, and would be preserved until the mass was entirely dissolved. Two amalgam fillings show a line at the junction, because the soldering is coarser or contains more mercury than the filling on either side. A single thickness of gold placed in the joint would be the last portion to be dissolved.

Where gold and tin are combined for guard fillings, when only a few layers of tin foil are used, all over one or two thicknesses of the tin which is in contact with the gold will be dissolved and become a black metallic paste. It is better to use a thin lining with gold, or make it quite a portion of the filling. Either plan works well, as no tin will be dissolved. Large fillings can be made of gold and tin, which become as hard and durable as amalgam, but they must be used in alternate layers. Too much gold will do no harm, but tin in excess will be dissolved out, leaving pits upon the surface, these changes only occurring as the filling is wet.

Dr. Palmer did not disagree with the belief that, where decay has advanced around the margins of gold fillings, so that external liquids are admitted, the same causes were at work as in the primary decay, but he wished to stand on record as believing that acids are furnished beneath gold fillings by electrolytic action, independent of the action of ferment organisms, even when the margin is perfect; a belief founded on twenty years of study and observation. The benefit of this knowledge consists in knowing that perfect manipulation of gold will not prevent the decomposing energy from passing through the filling the same as heat or electricity.

In filling low-grade dentine with gold the metal is placed in contact with living organic tissue, the surface of which is devitalized and its sensibility destroyed. This does no harm unless the dentine is an electrolyte or non-conductor. When it is a conductor, devitalization continues by electrolytic action, the current being conducted through the filling. Gold in the mouth is charged with electricity, which charge is called electric potential, the degree of which is determined by that which is in the mouth at the time. Saliva is nearly neutral as to acid or alkali, but is easily decomposed by other elements taken into the mouth as food. The sensation of taste is due to chemical action upon saliva. Electricity proper belongs to the mineral kingdom, which is why currents generated by galvanism are not pleasant to the taste, nor are the elements from which such currents are generated nutritious as food.

Dentistry has to do mostly with organic chemistry. The greatest difficulty seems to be that there is no accepted authority for the writer's belief that in the mouth there is a continuity of electric laws, as in a cell. The current is organic, as are the elements which produce it. Dr. Palmer here illustrated the difference between mineral and vegetable or animal foods by a number of examples, reaching the conclusion that we cannot thrive on minerals,—a deep study, which belongs to dentistry. With poor advantages and little help from books, and with no little opposition, years of study have done but little; but the study will go on, and in time electro-dental chemistry will be recognized and included in dental studies. Then the medical chemist will not fill the demands of an up-to-date dental college.

During the mastication of condiments, or the drinking of liquids like soda-water, all gold in the mouth is raised in potential, and being in contact with the mucous membrane of the mouth, tongue, etc., the potential, or charge, runs down. During the time any condiment of contrast with saliva—acid fruits in particular—is in the mouth, the current passes from the gold into the decalcified or poorly decalcified dentine beneath the gold. This is what is meant by decomposition by acid direct by electrolysis. Again, when such fillings leak, and receive external agents, decay is more rapid than it would be around a filling of gutta-percha equally leaky, because the two agents, external and internal, work in harmony for decomposition.

Having considered the action of gold and tin in contact with low-grade dentine, we take up amalgam made from alloy containing two or more metals. Amalgam is not homogeneous ; even when hardened it contains particles of alloy in filings having less mercury than that which is thoroughly amalgamated. Local currents are set up on the surface of the plug ; the portion containing the most mercury is dissolved first, giving a granulated appearance to the filling. When amalgam is placed against the walls of a cavity, chemical action takes place at once, by reason of the moisture in the dentine forming an insoluble compound by the combination of the salts of the metals with the organic portions of the dentine, so that no acids are furnished to further dissolve the lime elements. Some contend that this compound is antiseptic, and thus prevents the formation of acids.

Amalgam fillings—more frequently those of high grade—are said to shrink after several years. This is, perhaps, because the surface-action under the filling is so rapid that metallic salts are held in solution and do not fill the dentine, acid resulting, which dissolves the surface of the plug. To overcome this tendency, Dr. Palmer frequently lines large cavities with tin foil. The amalgam cuts the tin even with the enamel, so that no tin is exposed. The metal in contact with the dentine is tin amalgam, which does not discolor the teeth ; on the other side, the tin blends the elements of the amalgam, which prevents local action and shrinkage.

Lining cavities with varnish has been recommended for fifteen years or more. Why the filling of the surface of porous dentine with some substance which will close the tubuli and unite with the filling so as to exclude moisture should have received so little attention, is beyond comprehension. When sensitive dentine has been dried, the surface is not sensitive ; if filled while dry with varnish or by melting in paraffin, sensitiveness does not return. Such a coating is not metal, and vitality is not destroyed by contact with it. Do not varnish enamel where contour work is to be done, as it is not needed, and it would prevent the fine mechanical friction which gold has on enamel. If heavy varnish is used under amalgam, the fillings remain bright on the hidden surfaces, showing that there is no leak.

It is generally conceded that decay is the effect of acids—no matter what their origin—upon the lime. Exclude the moisture and chemical action ceases. Phosphate fillings are sometimes greatly benefitted by protecting the dentine from the effects of acids. In filling with gutta-percha, if the cavity is varnished and dried with hot air, each piece of gutta-percha remains fixed under pressure, so that the surface of the filling when completed can be cut away without drawing the filling from the walls. The writer believes that prejudice against "sticking in gold fillings with varnish" has prevented many from using a valuable aid in filling cavities of a specified character. Nothing can be more perfect than a gold filling properly put into a varnished cavity.

In enforcing the idea that crowns and bridges convey to the nerve-tracts electric disturbances, Dr. Palmer related the case of a young lady who had had a bridge inserted two years before, anchored to the first lower left bicuspid and extending to the second molar. From the first the gums around the gold bands and the necks of the teeth became sensitive, the only permanent relief coming from the use of nitrate of silver. There was every appearance that the gold impinged upon the periosteum, causing mechanical irritation, but the trouble came from the gold conducting the current to the gums at the necks of the teeth, where it passed into the tissue. The upper teeth which articulated with the bridge were filled with gold, some of which was contoured to come into contact with the gold below. One by one these gold fillings were removed, the surface of the dentine beneath them being found sensitive, and the cavities were filled with gutta-percha. He expected to replace these with gold, and in the condition in which the dentine will be found, by the use of varnish or paraffin, he will fill with full confidence of success.

The selection of the next place of meeting and the election of officers, before reported, was then proceeded with, after which the usual votes of thanks were adopted, and the association adjourned to meet at Saratoga Springs the first Tuesday of August, 1896.

COLORADO STATE DENTAL ASSOCIATION.

THE tenth annual meeting of this association was held in Denver, June 9, 10, 11, 1896. The following officers were elected for the ensuing year: J. H. Parsons, D.D.S., president; Sarah May Townsend, D.D.S., first vice-president; R. A. McGee, D.D.S., second vice-president; J. S. Jackson, D D.S., corresponding secretary; A. L. Whitney, D.D.S., recording secretary; Wm. Smedley, D.D.S., treasurer. The last two were re-elected.

Colorado Springs was decided upon as the next place of meeting, on the second Tuesday in June, 1897.

A committee consisting of Drs. J. M. Norman, J. S. Jackson, and M. H. Smith reported appropriate resolutions on the death of Dr. W. F. Bradner, of Denver, an active and useful member of the association, which were unanimously adopted.

A. L. WHITNEY, *Secretary*, Denver, Col.

ILLINOIS STATE DENTAL SOCIETY.

THE thirty-second annual meeting of the Illinois State Dental Society was held at Springfield, May 12 to 15, 1896. A good program was carried out, and a large attendance was present. The following officers were elected:

C. R. Taylor, Streator, president; E. B. David, Aledo, vice-president; Louis Ottofy, Chicago, secretary; E. D. Swain, Chicago, treasurer; J. R. Rayburn, Fairbury, librarian. The next meeting will be held at Peoria, beginning on the second Tuesday in May, 1897.

Louis Ottofy, *Secretary*,
Masonic Temple, Chicago, Ill.

CINCINNATI ACADEMY OF DENTISTRY.

At the regular meeting of the Cincinnati Academy of Dentistry, held Monday evening, April 27, 1896, the following officers were elected for the ensuing year: W. T. McLean, M.D., D.D.S., president; A. I. F. Buxbaum, M.D., D.D.S., vice-president; J. F. Clayton, D.D.S., treasurer; Wm. Lockman, Jr., D.D.S., secretary.

DENTAL COLLEGE COMMENCEMENTS.

NATIONAL UNIVERSITY—DENTAL DEPARTMENT.

The twelfth annual commencement exercises of the Dental Department of the National University were held, in connection with those of the Medical Department, in Metzerott Hall, Washington, D. C., on Thursday evening, June 11, 1896.

The address to the graduating classes was delivered by Professor W. D. Bigelow, Ph.D., and the valedictory address by Edgar W. Watkins, M.D.

The number of matriculates for the session was forty.

The degree of D.D.S. was conferred on the following graduates of the dental class:

NAME.	STATE.	NAME.	STATE.
Peter T. Kirwan	New York.	J. Vernon Priddy	Dist Columbia.
Edmund O. Pigeon	New York.	E. E. Rankin	Indiana.
Joseph Pospisiel, M.D	Wisconsin.	A. B. Stine	Pennsylvania.

UNIVERSITY COLLEGE OF MEDICINE—DENTAL DEPARTMENT.

The annual commencement exercises of the Dental Department of the University College of Medicine were held in the Academy of Music, Richmond, Va., on Wednesday, April 29, 1896.

The annual oration was delivered by ex-Governor Fitzhugh Lee, of Virginia.

The number of matriculates for the session was thirty-six.

The degree of D.D.S. was conferred on the following graduates by Stuart McGuire, M.D., Professor of Principles of Surgery:

NAME.	STATE.	NAME.	STATE.
F. V. Clarke	Virginia.	J. E. Marshall	Virginia.
W. J. Cowardin	Virginia.	E. C. McSparran	Virginia.
Geo D Farrow	Virginia.	Chas. A. Newland	Virginia.
Frank Ferguson	South Carolina.	A. C. Oppenheimer	Virginia.
M. T. Gay	Virginia.	Wm. Pilcher	Virginia.
John H. Hartman, Jr.	Virginia.	E. U. Potter, Jr.	Virginia.
W. R. Lyman	Virginia.		

UNIVERSITY OF PENNSYLVANIA—DEPARTMENT OF DENTISTRY.

AT a public commencement of the University of Pennsylvania, held Thursday, June 11, 1896, at the American Academy of Music, Philadelphia, Pa., the degree of Doctor of Dental Surgery was conferred by Charles C. Harrison, A.M., LL.D., provost, upon the following candidates:

NAME.	STATE OR COUNTRY.	NAME.	STATE OR COUNTRY.
Francis S. Avil	Pennsylvania.	William E. Kiner	Pennsylvania.
Fayette H. Beard	Pennsylvania.	Frederick F. Knapp	Pennsylvania.
Charles D. Bender	Pennsylvania	Allison R. Lawshe	New Jersey.
John C. Benz	New York.	Walter W. McCarty	Iowa.
Charles S. Blaker	Pennsylvania.	William C. Marsh	Massachusetts.
Carl Bönten	Germany.	Sherman M. Matheny	Pennsylvania.
Alfred E. Bull	Pennsylvania.	Lucius P. Meaker	New York.
Guy M. Byrkit	Iowa.	Ludwig Moestue	Norway.
Ernest E. Cardwell	England.	Edward H. Moore	Pennsylvania.
J. Edward Chace	Florida.	Daniel K. Musser	Pennsylvania.
C. A. Christine, Jr	Pennsylvania.	John H. O'Hagan	New York.
Samuel T. Clay	Pennsylvania.	J. Howard Ozias	Pennsylvania.
Thomas J. Clemens	Pennsylvania.	George C. Parry	New York.
Charles W. Colborn	Pennsylvania.	C. Gilbert Pearse	England.
Albert L Connelly	Pennsylvania.	Fred. E. Pottle	Maine.
J. Harold Cornell	Pennsylvania.	Harry S. Prichett	Minnesota.
Nile Crist	Pennsylvania.	Charles W. Rabb	Pennsylvania.
Clyde Decker	New Jersey.	Edward D. Rank	Pennsylvania.
Herbert B. Denis	New Jersey.	Harry F. Reynolds	Pennsylvania.
G. Henry S. Dobbyn	Australia.	Charles Ruegg	Switzerland.
James A. Dowden	New York.	Morris I. Schamberg	Pennsylvania.
John Earley, Jr	Pennsylvania.	Frank H. Schultz	Ohio.
Wm. S. Eisenhart	Pennsylvania.	Joseph Schürger	Hungary.
Alfred B. Ellen	Pennsylvania.	Blake A. Sears	New York.
Morris F. Elliott	Pennsylvania.	James C Seymour	Nebraska.
Malcolm Ellis	Brazil.	Herbert H. Shapard	Texas.
William Farrar	Ohio.	Vane G. Shiffler	Pennsylvania.
Carl Feibusch	Germany.	George C. Speirs	Connecticut.
T. Stanley Gamble	Pennsylvania.	Nathan P. Stauffer	Pennsylvania.
V. Walter Gilbert	Pennsylvania.	P. Albert Taeuber	Switzerland.
Nicholas J. Graeber	Pennsylvania.	Wm. D. Tracy	Massachusetts.
William C. Graham	Ohio.	Otto Venn	Germany.
Pearl Z. Grey	Ohio.	S. Albert Walker	Pennsylvania.
G. Clifton Guest	Pennsylvania.	Elbert J. Weaver	Wisconsin.
John P. Headridge	England.	W. L Webster	New York.
Harry B. Hickman	Delaware.	Charles M. Wharton	Delaware.
J. Ernest Keeler	Pennsylvania.	Wm. Yeakel, A.B.	Pennsylvania.

The number of matriculates for the session was three hundred and twenty-three.

PHILADELPHIA DENTAL COLLEGE.

AT a commencement of the Philadelphia Dental College, held in the college building, May 19, 1896, the following gentlemen had the degree of D.D.S. conferred upon them by Charles P. Turner, M.D., secretary of the Board of Trustees: William T. Casey, Connecticut; J. R. Melanson, Louisiana; C. H. Stitzer, Pennsylvania; George LeR. Sturgis, Connecticut.

S. H. GUILFORD, *Dean.*

WESTERN RESERVE UNIVERSITY—DENTAL DEPARTMENT.

THE annual commencement of the Dental Department of Western Reserve University was held in Association Hall, Cleveland, O., May 19, 1896, at 7.30 P.M.

The principal address was given by Dr. J. M. Buckley, D.D., of New York city.

The number of matriculates for the session was fifty-three.

The degrees were conferred by the president, Chas. F. Thwing, D.D., upon the graduates, as follows: William G. Ebersole, Frank H. Fagan, Joseph W. George, William O. Haldy, Charles E. Hurd, John W. L. Thomas, John S. Van Meter, all of Ohio.

◆

DENTAL SOCIETY ANNOUNCEMENTS.

AMERICAN DENTAL ASSOCIATION.

DR. H. J. BURKHART requests us to announce that at the meeting of the American Dental Association at Saratoga, rooms will be furnished free of charge by the proprietors of the Grand Union Hotel, which has been chosen headquarters, for Faculties and Examiners' Associations, School of Technics, etc.; also rooms for the Section meetings.

NATIONAL ASSOCIATION OF DENTAL FACULTIES.

THE annual meeting of the National Association of Dental Faculties will be held at Saratoga Springs, on Saturday, August 1, 1896, at ten o'clock A.M. The Executive Committee will meet on Friday, July 31, at ten o'clock A.M. Those having matters to bring before this committee will do well to bear this meeting in mind. The work of this committee is preparatory to that of the general meeting. All communications requiring the attention of the Executive Committee should be sent to the chairman.

Dr. J. TAFT, *Chairman of Executive Committee,*
Berkshire Building, Cincinnati, O.
Dr. LOUIS OTTOFY, *Secretary,*
Masonic Temple, Chicago, Ill.

NEW JERSEY STATE DENTAL SOCIETY.

THE twenty-sixth annual session of the New Jersey State Dental Society will be held in the "Auditorium," at Asbury Park, N. J., commencing Wednesday, July 29, 1896, and continue in session until adjournment. Essays on subjects pertaining to dentistry will be read by the most eminent men in the profession. Twenty-seven clinics on the afternoon of the 29th will be of the utmost interest. Fifteen hundred feet of space for exhibitions, already nearly filled. Many new electrical appliances for the first time exhibited. New Jersey headquarters, "The Columbia"; rates, $2.50 to $3.00 per day. Board in the Park, from $8.00 to $45.00 per week.

Come and see us. CHAS. A. MEEKER, D.D.S., *Secretary,*
Newark, N. J.

MINNESOTA STATE DENTAL ASSOCIATION.

THE thirteenth annual meeting of the Minnesota State Dental Association will be held in Winona, August 19, 20, and 21, 1896. The Executive Committee decided to change the date from the usual time to the above.

The meeting will be more practical and interesting than ever. Among the social features will be an excursion on the Mississippi River, given by the Winona County Dental Society.

A cordial invitation is extended to all to join with us.

H. L. CRUTTENDEN, *Secretary*,
Northfield, Minn.

EDITORIAL.

SOME NEW DEVELOPMENTS IN LOCAL ANESTHESIA.

IN a work by Dr. Schleich (*Schmerzlose Operationen*) published somewhat over a year ago, the author gives an account of his experiments, extending over several years, in the induction of local anesthesia ; and as the result of his studies he recommends the employment of extremely dilute solutions of cocain hydrochlorid in a menstruum of water five hundred parts, sodium chlorid one part, morphia hydrochlorid one-fourth part. His cocain solutions are of three strengths, a "strong solution," containing cocain hydrochlorid one to five hundred of the menstruum, a "medium solution," containing one part of cocain salt to one thousand of the vehicle, and a "weak solution," containing one-tenth part of cocain salt to one thousand parts of the solution.

The medium solution is the one most frequently employed by Dr. Schleich. Of the strong solution twenty-five grams may be used, of the medium one hundred, and of the weak five hundred grams. The solutions are in each case sterilized before use.

The results reported by Dr. Schleich and others who have tested his method are said to be highly satisfactory, and if it can be clearly shown that by the Schleich method a considerable reduction can be made in the dose of cocain necessary to produce local anesthesia to an operable degree a great advance will have been achieved in this direction, for perhaps the greatest objection to the legitimate use of cocain has been the uncertainty of its action with respect to toxicity. No maximum safe dose of cocain can be definitely stated, as individual cases react differently toward equal doses of the drug. Cases of fatal poisoning are reported where the amount of cocain administered was far below that safely endured by other individuals. It is this element of uncertainty in the effect of cocain which constitutes the greatest danger in its use. It would seem that by the

Schleich method the danger of an overdose was, if not eliminated, at least greatly minimized. It would be interesting to know how much further the amount of cocain in the anesthetic solution could be reduced without destroying its efficacy.

An important feature of the Schleich method is the technique of performing the operation. The liquid is injected until the blood is driven out of the tissues and a blanched wheal is produced. The next introduction of the hypodermic needle is to be made always within the blanched territory, and the injections are repeated in this manner until the territory of operation is completely anesthetized.

Emphasis is placed by the author of the method upon the importance of forcing the anesthetic into the tissues until all blood is driven out and a white wheal is produced.

The question may be raised as to what extent the resulting anesthesia is dependent upon the replacement of the blood of the part by a foreign liquid. There is reason to believe that local anesthesia may be induced by the injection of distilled water alone into the tissues.

We published in this journal (November, 1891, page 1040) a report by Dr. F. A. Lane, Macomb, Ill., of a series of cases where the injection of simple distilled water was sufficient in a number of cases to produce anesthesia during the extraction of teeth. If such a result is possible, the facts should be utilized in developing the application of local anesthesia in the extraction of teeth along lines which will reduce to a minimum the amount of cocain required.

A recent candidate for favor as a substitute for cocain is issued by a German firm, and called eucaine; it is said to be without the toxic effect of cocain. We shall wait with interest for reports of tests of this new drug and the progress made in the induction of a safe local anesthesia which seem to be pending the further study of the means above noted.

MORE AFTER-THOUGHTS.

In the June issue of the *International Dental Journal* its editor gives expression to his understanding, or rather misunderstanding, of the meaning of our editorial in the April Cosmos, and calls for an explanation. We have on so many occasions made the effort to clearly state the grounds for our belief in the uric-acid theory of the etiology of certain forms of pyorrhea that we felt justified in indulging the hope, whatever might be the views held as to the correctness of our belief, that there could be no misunderstanding as to the basis of that belief.

The editor of the *International* quotes from us as follows: "Careful analysis, both chemical and microscopic, of concretions from or near the apices of tooth-roots in typical pyorrhea cases demonstrated the uniform presence of uric acid and its salts. This fact alone is of the utmost significance, for by it we are not only confronted with a fundamental chemical difference in the two classes of concretions, . . . but we are furnished with valuable confirmatory evidence of their difference in origin.''

The first section of the quotation is a statement of fact based upon the results reported by Dr. Peirce. We believed this report by Dr. Peirce when it was first published because of our faith in the honesty and accuracy of the gentlemen concerned in the investigation, and continued to believe it because we immediately and frequently thereafter made numerous similar tests and obtained results which were confirmatory of those published by Dr. Peirce. The remainder of the quotation we believe to be a logical deduction from the facts stated in the first section. If it is not, we shall be grateful to any one who will show us in what respect it is erroneous.

The editor of the *International* is on record for a disbelief in the possibility of these acute local inflammatory conditions produced by concretions ''at or near the apices of tooth-roots''—even in the face of the affirmative testimony of numerous reliable witnesses (see DENTAL COSMOS, March, 1895, pp. 198 *et seq.*, and *International Dental Journal*, March, 1895, pp. 178 *et seq.*). Therefore he is without solid ground upon which to support a belief in serumal or sanguinary tartar, for unless he can prove that a given concretion has been produced without access of saliva, he has no evidence that it was not to some extent at least salivary in origin. Lacking such evidence for himself and disbelieving the testimony of others, the acceptance of Dr. Peirce's theory becomes impossible, as the whole fabric of it rests upon the distinction which he makes as to origin and composition of the two classes of concretions,—viz, ptyalocalcic and hematocalcic.

As to another statement of ours called in question by the editor of the *International*,—viz, '' It should be noted in this connection that the murexid reaction is purely a qualitative test for detecting the presence of uric acid, and gives but an imperfect basis for its quantitative estimation,''—it would seem that the statement quoted was sufficiently clear as to its meaning, at least to any one familiar with the methods of chemical analysis. A reaction may have great value in determining the presence of a given substance in a mixture or compound, but be worthless as a means for determining how much of it is present, and the murexid reaction is of that class. Analytical chemistry furnishes many similar instances ; for example, the reaction of ferric salts toward potassium sulfocyanid is extremely delicate and furnishes a characteristic color-test for the presence of iron under certain conditions, but the test is of no value in determining the amount of iron quantitatively. It will give a decisive answer to the question, Is iron present? but will fail to answer, How much?

The grounds for criticism of the results reported by Dr. Talbot, so far as the analytical part of the work is concerned, are fully set forth in our preceding issue. There is not, so far as we can see, anything obscure in our statement that "the murexid reaction is easily obtained where we have to deal with considerable amounts of uric acid or its salts;" or, "The case is quite different when minute traces of these compounds are to be detected; or, "The directions usually given in the books for detecting uric acid are as a rule faulty when applied to the material under consideration." All of this we reaffirm, and have explained in our previous issue the fault of the usual routine method of making the test as applied to Dr. Talbot's cases by the chemist, Dr. Wesener. The inference which the editor of the *International* draws from the foregoing statement, which he quotes and italicises, is not only unwarranted, but it is a perversion of the meaning of the sentence quoted. He says, "If, then, the murexid test is so faulty, what becomes of all that has been said in relation to uric acid and its salts in connection with pyorrhea?" The simple expedient of parsing the word "are" in the statement "the directions usually given in the books for detecting uric acid by the murexid test *are*, as a rule, faulty when applied to the material under consideration," etc., will quickly settle the meaning of the statement, which we intended to be taken literally as stated.

As a direct answer to the request that we should state what constitutes a reliable test for uric acid, we believe that the murexid test when properly performed is, all things considered, the most reliable qualitative test we have, especially in the testing of serumal deposits for uric acid.

Finally, the whole question rests for its solution upon the relative weight of evidence. Dr. Peirce and those who think they see a rational explanation of the etiology of certain forms of pyorrhea in the theory which he has announced have brought out certain facts in support of their belief. The opponents of the view of Dr. Peirce and his adherents have as yet failed to adduce either fact or theory to show that the uric-acid theory is incorrect; the nearest approach to it being the hypothesis advanced by Dr. Talbot that the disorder is an atheromatous disease of the pericementum, which is explaining a disease by giving it a new name. It would be well to explain the etiology of the atheromatous degeneration, which, by the way, has already been numerously done upon the uric-acid theory.

In any scientific contention it is an evidence of weakness of position and lack of scientific accuracy to impute a dishonorable motive to an opponent, as is clearly implied in the statement of the editor of the *International* that, "As the case stands at present, it looks very much as though it had resolved itself into discrediting the witnesses on the other side to sustain an untenable hypothesis." If the presentment which we have made of our basis of faith produces any such appearance, the phenomenon must be, like beauty, "in the eye of the beholder."

That all forms of pyorrhea are due to retention of uric acid we do not believe, but that certain well-marked cases constantly presenting are solely due to that cause we have no doubt: not because of a theory, but because of data resulting from scientific research and the application of the information thus gained to successful therapeutic treatment.

OBITUARY.

DR. W. E. MAGILL.

DIED, at Erie, Pa., May 26, 1896, of apoplexy, Dr. WILLIAM E. MAGILL, in the seventy-first year of his age.

The death of Dr. Magill removes one who for half a century has been identified with dental practice in Pennsylvania. He was born at Meadville, Pa., May 29, 1825. In 1844 he commenced the study of dentistry with Dr. A. B. Robbins, of Meadville, and after a successful dental pupilage, in 1848 entered practice at that place on his own account. He soon, however, removed to Erie, where he established a practice that extended over a long period, up to the time of his death. He was a member and some time president of the Lake Erie and Pennsylvania State Dental Societies, and also chairman of the Pennsylvania State Board of Dental Examiners.

Dr. Magill was a man of pronounced convictions, and one whose character was well founded on principles of right, equity, and justice to all men; kindly and sympathetic toward the suffering and oppressed; valiant in the cause of right; a wise and friendly counselor to all who sought his advice. He was everywhere held in high esteem by all who knew him.

In his professional relations Dr. Magill rendered great service as a member of the Pennsylvania State Dental Examining Board, where his strict probity and adherence to duty were a potent safeguard against the admission of unqualified men into the ranks of the profession. As a member of the Pennsylvania State Dental Society, his wise counsels and ripe experience did much toward establishing higher ethical and professional standards throughout the state. His death is a loss to his colleagues and co-workers which can never be repaired. Others will continue the work in their own way, but the combination of valuable and admirable characteristics manifested in the activities and life-work of Dr. Magill were peculiarly his own, and as such pass away with him.

In 1857 Dr. Magill was married to Miss Louisa Jones, of Erie. Besides the bereaved widow, four sons survive him,—Edward and Jewett Magill, of Chicago; Louis J. Magill, of the United States Navy, now in Washington, D. C., and Dr. Will Magill, who was associated with his father in the practice of dental surgery.

DENTAL LEGISLATION.

BRITISH COLUMBIA DENTAL LAW.

At the request of the British Columbia Board of Dental Examiners we publish the following specification of requirements demanded of applicants before a license can be obtained to practice dentistry in British Columbia :

The candidate must be a graduate of some English, Canadian, or American dental college recognized by the American Association of Dental Faculties, and pass a satisfactory examination in the following subjects :

Anatomy, physiology, operative dentistry, dental pathology and therapeutics, chemistry, materia medica, anesthetics, oral surgery, and metallurgy.

In prosthetic dentistry the applicant will be required to do the following work :

One full upper denture on rubber, one partial denture not less than four teeth on gold or silver, one continuous-gum set not less than four teeth, one porcelain inlay, one gold crown, one bridge not less than four teeth, one partial rubber set not less than four teeth.

Thirty days' notice, accompanied by the fee, thirty dollars, to be sent to the secretary before the examination will be given.

T. J. Jones, L.D.S., *President.*
A. R. Baker, D.D.S., *Secretary,*
Box 69, Victoria, B. C.

◆

HINTS, QUERIES, AND COMMENTS.

Impure Alcohol and its Influence on the Physical (Cohesive) Properties of Gold.—By impure alcohol we mean anything below a ninety-four per cent. by weight of the ethyl alcohol with a specific gravity of 0.820 at 60° F. This is really impure because it contains six per cent. of water, but for all pharmaceutical and medicinal purposes it is accepted as pure.

There are three officinal strengths of the spirit, varying in specific gravity from 0.817 to 0.928 at 60° F. These contain from five to fifty-three per cent. of water, assuming that they are free from other impurities.

The term "Alcohol" is a generic one, and means a spirit of the specific gravity of 0.820. According to the alcoholmetric table of Tralles, this has about six per cent. of water in it. Absolute alcohol should be free from water or other impurities.

Fusel oil (amylic alcohol) is one of the impurities usually found in the drug. If the pure article is purchased by the dentist (and I doubt whether it ever is), and is kept in a can or bottle, loosely stoppered and exposed to the light and heat, it will become diluted by evaporation and absorption of moisture from the air. Alcohol has a great attraction for water. The alcohol usually procured from the saloons is inferior, and is more or less diluted with water and with other drugs.

I have gotten "pure alcohol," so called by the liquor dealer, that would not burn at all in the lamp, and at other times the flame would be of such a doubtful color, red, greenish-orange, or yellow, that I could not afford to anneal my gold over it, and especially if I had a contour filling to make.

These are some of the rules for ordinarily testing the purity of alcohol

(U. S. D.): It should not change the color of red or blue litmus paper previously moistened in water. If a portion be evaporated to one-fifth its volume, the residue should not turn reddish upon the addition of an equal volume of sulfuric acid (amyl alcohol).

When treated in a test-tube with an equal volume of solution of potassa, there should not be an immediate darkening of the liquid (methyl alcohol, aldehyd, and oak tannin). A simple approximate test for the per cent. of water is as follows: Moisten a small slip of filtering paper thoroughly with the alcohol and set fire to it. If when the alcohol is burned out the paper catches fire readily, the latter must be stronger than eighty per cent. If the paper barely catches fire, the strength may be presumed to be between seventy-five and eighty per cent. If it does not catch at all, the alcohol cannot be stronger than seventy-three per cent.

My attention was first called to inferior alcohol in the use of annealing gold preparatory to tooth-insertion, by one of my loved teachers. We were walking through the operating-room of the college building one afternoon watching the different students operate. One little fellow from Texas was tugging away at a small gold filling in the approximal surface of a superior bicuspid. The doctor, through great love and sympathy for the poor fellow, tried to help him out, and gently tapped him on the shoulder and said, "My friend, fill your lamp with fresh alcohol. You are carbonizing your gold with that flame, and no wonder you can't get your gold to 'stick.'" I never thought about the remark again until about four years ago, when I had a patient return to me with three large contour gold fillings breaking and scaling off that I had inserted but a short time before. I began to search for the cause of this, for I had used a superior foil,—White's Globe,—and had taken more than usual care with the case, the patient being a pretty woman. I then recalled the words of my instructor, and at once saw that the fault lay in the annealing lamp and its contents.

This was not the first time a failure had occurred from this cause The vessel in which the alcohol is kept should be absolutely air-tight, and kept in a cool, dark place. The lamp should also be hermetically sealed when not in use. Alcohol has a great affinity for water, and it is much diluted by exposure to air. If you have a faulty lamp made of metal (glass globe and metal top), such as are very frequently used by dentists, there will be leakage and dilution of your spirits, and an imperfect flame. The caps of these lamps fit imperfectly. The little reel that runs the wick up and down allows the leakage of alcohol and the entrance of moisture from the air to the reservoir to be mixed with the remaining alcohol, and instead of having a pale blue flame without residue, showing complete combustion as from "good" alcohol, you have a red, yellowish, or orange-green flame, showing there is more or less carbon being given off. Such lamps are not fit for use in annealing gold. The burner of an alcohol lamp requires no aëration, or draft, to give a perfect flame. The burner should fit so closely to the globe of the lamp that no air can pass around it into the part occupied by the alcohol. The wick should just fit in the burner,—not tightly, but just close enough so that the capillary attraction of the molecules of the alcohol will be at its maximum. If absolute alcohol is used, there will be complete combustion. Gold should be annealed only over such a flame. Annealed over other than a clean lamp and wick, with "pure alcohol," you will have incomplete union, or cohesion, and your filling will be a failure. Some dentists use the same lamp at the operating chair that they use in the laboratory. It is the custom of a majority of operators to take the gold they wish to anneal in the foil-carriers and pass it directly over the flame. If passed over this flame, whose wick is already contaminated with dust, grease, and wax, it is impossible to get a flame free from carbon, and the cohesiveness of the gold will be injured more or less. The ground-glass topped lamps are the most perfect. The burners of these fit closely in a cork that stops the mouth of the lamp while in use, the ground-glass top preventing the admission of air while not in use.

All gold, that is wanted to be used as such, should be made cohesive by the manufacturers. They can get a uniform cohesiveness throughout that cannot be gotten by annealing the soft, non-cohesive gold over the alcohol flame. White's Globe, extra-cohesive, is as good as I ever used of this kind. While transportation and exposure will mar this cohesiveness to some extent, still it can be easily restored or revived by gently annealing over a perfect flame or the annealing tray. (See DENTAL COSMOS, November, 1893, page 37 of the advertisements. This is a neat and good annealing device,—possibly as good as there is on the market.)

Many otherwise perfect, durable, lasting, and servicable fillings have been ruined by the imperfect annealing and carbonizing of the material over an imperfect flame made of an inferior grade of alcohol.

A filling is no stronger than its weakest point. The carbonization of gold certainly ruins the union, density, and rigidity of its essential characteristic, welding cold, that makes it of so great service in dental conservation.

Dentists should use only the absolute, anhydrous, ethyl alcohol. I will hail the day when our supply houses can furnish it to us in the pure state.—S. W. JOHNSON.

ALCOHOL AND COHESIVE GOLD.—In Germany, also in Austria, there are two kinds of alcohol: the pure alcohol, containing about ninety-five per cent., and the "denatureted spiritus," which kind of alcohol contains a certain amount of pyridine, C_5H_5N. I made the observation that sometimes the percentage of pyridine is so great (through evaporation of the alcohol) that gold foil annealed with such alcohol will not cohere at all, or not so quickly as the operator is accustomed to. It must be stated that the exact percentage of pyridine is prescribed by the law, also that it is not the pure pyridine which is used, but merely the basis of this drug.

I had another case where the gold fillings, after polishing, showed a whitish appearance just as if some mercury had come in contact with the surface. Here the cause of the trouble was that my gold annealing lamp containing no alcohol, I used the lamp with which I ordinarily anneal copper amalgam.

After two years of practical use, I can say that the small Bunsen burner, obtainable of The S. S. White Dental Mfg. Co., is the best thing for annealing gold I ever used.—DR. E. C. W. S., Munich.

LIQUID SILEX.—The solution known by this name, or as soluble glass, chemically the sodium silicate (Na_2SiO_3), is quite as effective a medium to prevent the adhesion of plaster to vulcanite as is tin foil, but certain precautions are necessary to procure the best results. The material should be kept in a moderately warm place, and tightly stoppered. As soon as its viscidity becomes greater than that of a thin syrup, throw it away and buy a new bottle. Should it lose its perfect clearness, discard it. The writer finds that about one-third of the four-ounce bottles in which it is sold is useful; the remainder is usually so deteriorated as to be worthless. Dilution with hot water and warming the solution restores its appearance, but for dental purposes not its virtues. The model, after investment, and also the teeth and entire investment, are freed of adherent wax by pouring over them a stream of *boiling* water. The excess of water is absorbed by means of bibulous paper. As soon as the wet appearance disappears from the plaster, it is ready to receive the silicate, not before.

A camel's-hair brush, having a fine point and no loose hairs, is dipped in the solution and the surplus wiped off the brush. The plaster surfaces, all of them, are painted lightly with the silex, carefully avoiding contact with the porcelain or platinum pins. By means of the fine point on the brush the matrix of the rim is painted between the teeth; in coating the cap side of the investment, much care is required to prevent touching the teeth. Small wisps of bibulous paper are quickly and gently passed over the painted surfaces until there is but a thin glaze covering every part of the plaster. The pieces should be set aside for at least fifteen minutes, to permit thorough hardening of the silex. After vulcanizing the flasks should not remain unopened over night, for if salt (sodium chlorid) has been used to hasten the setting of the investment, the surface of the vulcanized plate will be covered by a hard and tenacious gloss; if opened as soon as cold the plaster and silex part from the vulcanite, without even washing, leaving a smooth, glazed surface equal to that found under tin foil.

The mechanic may be certain that the lack of good results is due to either carelessness or faulty silex.

This is an important matter, as unquestionably many or most of the ills attributed to the wearing of vulcanite plates are due to roughness upon their palatal surfaces.—H. H. BURCHARD.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

The abbreviations of titles used are those common to bibliographical work, and will, it is presumed, be readily comprehended by any one familiar with dental or scientific publications. Any explanation will be gladly furnished by the compiler. A star (*) indicates a Thesis.

Abbott (Frank.) Dental pathology and practice. Philadelphia, 1896, S. S. White Co., 240 p., 3 pl. 8°.

Bödecker. Die Anatomie und Pathologie der Zähne. Wien u. Leipzig, 1896, W. Braumüller, 671 p. 8°.

Frey (Léon.) * Monographie de la dent de six ans. Paris, 1896, Soc. d'éd. scient., 80 p. 4°.

——— Pathologie des dents et de la bouche. Paris, 1896, J.-B. Baillière et fils, 274 p. 8°.

Miller (W. D.) Lehrbuch der conservirenden Zahnheilkunde. Leipzig, 1896, G. Thieme, 416 p. 8°.

Richter (Erich.) Zahnärztliches Adressbuch für Deutschland, Oesterreich-Ungarn, Schweiz, Dänemark, Schweden, Norwegen, Belgien, Niederlande, Russland und den Orient. VIII. Jahrgang für 1896. Berlin, 1896. 8°.

Sauvez. Anatomie et physiologie de la bouche et des dents. Paris, 1896, A. Maloine. 16°.

Spiess. Die Untersuchung der Mund- und Rachenhöhle (einschliesslich des Nasenrachenraumes). [Berlin-Klinik, Hft. 93.] Berlin, 1896, Fischer, 32 p. 8°.

Woodburn (W. D.) On extraction, with notes on the anatomy and physiology of the teeth, for medical students. London, 1896, Bailliere, Tindall & Cox, viii, 96 p. 8°.

Allan (C. F.) The needs of our profession; how can they best be met? Dental Cosmos, Phila., 1896, xxxviii, 369-373.—**Allwine** (H. W.) Molecular attraction in root-filling. *Ibid:* 379-381. ——— *Also:* Dental Rev., Chicago, 1896, x, 341-346.—**Ambler** (H. L.) Cataphoresis. Ohio Dent. J., Toledo, 1896, xvi, 221-224.—**Atchison** (J. T.) A dental prodigy. Louisville M. Month, 1896-7, iii, 77.—**Ballantyne** (J. W.) Congenital teeth, with three illustrative cases. Edinb. M. J., 1895-6, xli, 1025-1038, 1 pl.—**Bauer** (S.) Zahnverderbniss und Statistik. Cor.-Bl. f. Zahnärzte, Berl., 1896, xxv, 5-9.—**Bayon** (J. P.) Pulp ossification. N. Orl. M. & S. J., 1895-6, xxiii, 642-644.—**Beck** (C.) Carcinoma of the tongue. Clin. Recorder, N. Y., 1896, i, 8-14.—**Boody** (G.) On the study of the palate. Am. J. Insan., Chicago, 1895-6, lii, 541-544.—**Bostroem.** Aktinomykose der Mundhöhle und Kiefer. Cor.-Bl. f. Zahnärzte, Berl., 1896, xxv, 99-102.—**Boulai.** Ectopie naso-palatine de la première molaire supérieure droite. Arch. internat. de laryngol. [etc.], Par., 1896, ix, 96-99.—**Briggs** (E. C.) A talk on materia medica. Internat. Dent. J., Phila., 1896, xvii, 294-299. [Discussion], 310-314.—**Bruno** (L.) Un caso di resezione endocranica del nervo mascellare inferiore per nevralgia ribelle. Boll. d. clin., Milano, 1896, xiii, 1-8.—**Carllson** (Albertina.) Ueber den Zahnersatz bei Agama colonorum. Anat. Anz., Jena, 1895-6, xi, 758-766.—**Chiarugi** (G.) Rudimenti di un nervo intercalato fra l'acustico-faciale e il glosso-faringeo in embrioni di mammifero. Monitore zool. ital., Firenze, 1896, vii, 52-54.—**Christensen** (W. E.) Porcelain inlay work. Items Interest, Phila., 1896, xviii, 129-131.—**Cobb** (F. C.) Empyema of the antrum of Highmore. Boston M. & S. J., 1896, xxxiv, 455-460. [Discussion], 466.—**Cravens** (J. E.) Progressive calcification. Dental Reg., Cincin., 1896, l, 224-230.—**Custer** (L. E.) The electrical aspect of cataphoresis. Dental Rev., Chicago, 1896, x, 327-333.—**Dall'Acqua** (E.) Della stomatite ulcerosa. Pediatria, Napoli, 1896, iv, 73-80.—**Dana** (C. L.) Deformity and paralysis of the uvula as a stigma of degeneration. Am. J. Insan., Chicago, 1895-6, lii, 556-559.—**Davies-Colley.** Hare-lip. J. Brit. Dent. Ass., Lond., 1896, xvii, 244-250.—**Death** under chloroform at Idle: verdict of manslaughter. Brit. J. Dent. Sc., Lond., 1896, xxxix, 424-431.—**De Backer.** Le lisère gingival des tuberculeux. Rev. gén. de l'antiseps. méd. et chir., Par., 1896, ix, 97-99.—**Driscoll** (W. E.) Abrasion of the teeth. Items Interest, Phila., 1896, xviii, 133.—**Dubois** (P.) Traitement des fractures du maxillaire inférieur. Repert. de thérap., Par., 1896, xiii, 19; 69.—**Edward** (J. H.) Tooth extraction hæmorrhage. J. Brit. Dent. Ass., Lond., 1896, xvii, 213-220.—**Egger** (L.) Deux cas d'insuffisance vélo-palatine. Ann. d. mal. de l'oreille, du larynx, etc., Par., 1896, xxii, 365-370.—**Evans** (T. C.) Chancre of the tonsil and tongue, with report of four cases. Med. News, N. Y., 1896, lxviii, 519-521.—**Fermini.** La cloronarcosi in rapporto alla responsibilità medica. Corriere san., Milano, 1896, vii, No. 20, 1-6.—**Firthe** (C. A.) The treatment and filling of devitalized teeth. Dental Cosmos, Phila., 1896, xxxviii, 373-376.—**Flickinger** (A.) Removable crown and bridge work. Dental Rev., Chicago, 1896, x, 311-319. [Discussion], 351-356.—**Fox** (W. H.) Abnormal development as a result of traumatic injury. *Ibid:* 333-337.—**Freeman** (W. W.) Gold *versus* amalgam. Dental Pract. & Adv., Buffalo, 1896, xxvii, 33-35.—**Frentzel** (J.) Notiz zur Lehre von den Geschmacksempfindungen. Centralbl. f. Physiol., Leipz. u. Wien, 1896, x, 3.—**Galippe.** Note sur la recherche de l'acide urique dans le tartre salivaire au cours de la pyorrhée alvéolaire (gingivite arthro dentaire infectieuse). Compt. rend. Soc. de biol., Par., 1896, 10. s., iii, 418-420.—**Ghiandole** tuberculose e denti cariati. Gazz. d. osp., Milano, 1896, xvii, 345.—**Gill** (R.) On the mechanical factor in chloroform-anæsthesia. St. Barth. Hosp. Rep., 1895, xxxi, 155-168.—**Glaisby** (W.) Necrosis of the maxilla, following enteric fever. J. Brit. Dent. Ass., Lond., 1896, xvii, 229.—**Godfrey** (A. C.) Cleft palate and its treatment. Colorado M. J., Denver, 1896, ii, 107-111.—**Godon.** Exposé théorique de l'extraction des dents. Odontologie, Par., 1896, 2. s., iii, 132-137.—**Goodwillie** (D. H.) Surgical treatment of hare-lip and cleft-palate in children. Am. Med.-Surg. Bull., N. Y., 1896, ix, 583-588.—**Greve.** Ueber Volks- und Geheimmittel in der Zahnheilkunde. Cor.-Bl. f. Zahnärzte, Berl., 1896, xxv, 110-116.—**Grigsby** (E. S.) Anæsthesia by nebulized ether. Hahneman. Month., Phila., 1896, xxxi, 284-289.—**Guérard** (G.) Empyème du sinus maxillaire gauche avec déformation de la face; extractions dentaires; drainage. Ann. de chir. et d'orthop., Par., 1896, ix, 76-79.—**Hamilton** (W. H.) Report of two cases of neuralgia of the second branch of the fifth nerve; excision; relief. Ohio Dent. J., Toledo, 1896, xvi, 239-242.—**Hamecher** (H.) Aluminium contra Kautschuk. Vrtljschr. f. Zahnh., Wien, 1896, xii, 62-77.—**Harris** (T.) A case of carcinoma of the floor of the mouth and its subsequent mechanical treatment. J. Brit. Dent. Ass., Lond., 1896, xvii, 227-229 —**Harrison** (F.) Art metal workers. Brit. J. Dent. Sc., Lond., 1896, xxxix, 349-368.—**Harvalik** (V.) Beitrag zur Kenntniss der Caries der Zähne. Vrtljschr. f. Zahnh., Wien, 1896, xii, 22-30.—**Haskell** (L. P.) Geometrical rule in the arrangement of the teeth. South. Dent. J. & Lum., Macon, 1896, xv, 61.—**Hattyasy** (L.) Untersuchungen über Kali causticum und Acid hydrochloricum zur Behandlung gangränöser Wurzelcanäle. Vrtljschr. f. Zahnh., Wien, 1896, xii, 46-57.—**Hausle** (E. J.) Cocaine. Dental Pract. & Adv., Buffalo, 1896, xxvii, 30-33.—**Heidé.** Quelques inventions et procédés du Dr. Vajna, de Klausembourg. Odontologie, Par., 1896, 2. s., iii, 137-146.—**Helbing** (C.) Zur Casuistik der muskulären Makroglossie. Jahrb. f. Kinderh., Leipz., 1895-6, xli, 442-454.—**Heller** (A.) Ein Beitrag zur Theorie und Praxis der Wurzelfüllungen. Vrtljschr. f. Zahnh., Wien, 1896, xii, 30-46.—**Hesse.** Zur Würdigung der Metalltechnik. Deutsche Monatschr. f. Zahnh., Leipz , 1896, xiv, 184-189.—**How** (W. S) Dental vulcanite. Dental Cosmos, Phila., 1896, xxxviii, 376-378. —— *Also:* Ohio Dent. J., Toledo, 1896, xvi, 230-234.—**Howe** (J. M.) Notes on formic aldehyde. Internat. Dent. J., Phila., 1896, xvii, 286-294. [Discussion], 303-310.—**Huber** (G. C.) Observations on the innervation of the sublingual and submaxillary gland. J. Exper. M., N. Y., 1896, i, 281-295, 1 pl. —**Jones** (R. H.) Oral surgery. South. Dent. J. & Lum., Macon, 1896, xv, 5-8 —**Karminski** (C.) Tratamiento del empiema del seno de Highmoro. Gac. méd. catal., Barcel., 1896, xix, 225-232.—**Kehr** (S. S) Hypertrophy of the pharyngeal tonsils. Homœop. Eye, Ear & Throat J., N. Y., 1896, ii, 98-104.—**Kielhauser** (H.) Die Pulpahyperplasie: ein Beitrag zur Behandlung derselben. Vrtljschr. f. Zahnh., Wien, 1896, xii, 57-60.—**Kirchner.** Die Wurzelbehandlung mittelst der Galvanokaustik. Deutsche Monatschr. f. Zahnh , Leipz., 1896, xiv, 177-183. —**Lezin** (V. V.) [Cyst of the antrum of Highmore.] Laitop. russk. chir., S.-Peterb., 1896, i, 29-32.—**Lindemann** (W.) Vereinfachte Behandlung der Zähne mit blosliegender Pulpa. Cor.-Bl. f. Zahnärzte, Berl., 1896, xxv, 117-119.—**McAlpin** (A. C.) Some practical points in porcelain work. Dental Pract. & Adv., Buffalo, 1896, xxvii, 21-24.—**Macarovici** (P.) Starea dentisticeĭ si a dentistilor în România. Romania med., Bucurescĭ, 1896, iv, 141-144.—**Mahé.** Sur un cas d'anesthésie par le gaiacol. Odontologie, Par., 1896, 2. s , iii, 151-153.—**Marie** (P.) Sur un cas d'atrophie de la langue dans le mal de Pott sous-occipital. Rev. neurol., Par., 1896, iv, 195.—**Marina** (A.) Ein Fall von isolirter rechtseitger Hypoglossuslahmung höchstwahrscheinlich neuritischen Ursprungs. Neurol. Centralbl., Leipz., 1896, xv, 338-347.—**Marshall** (W. E.) First permanent molars. Dental Pract. & Adv., Buffalo, 1896, xxvii, 24-27.—**Matlack** (H. C.) A suggestion on the origin of some cases of pyorrhœa alveolaris. Dental Reg., Cincin., 1896, l, 230-234.—**von Metnitz** (J.) Ueber chronische Alveolar abscesse. Vrtljschr. f. Zahnh., Wien, 1896, xii, 1-21. —— *Also, transl.:* Odontologie, Par., 1896, 2. s., iii, 165-175.—**Meyer** (W.) Adenoide Vegetationen, ihre Verbreitungen und ihr Alter. Arch. f. Ohrenh., Leipz., 1895-6, xl, 1-24.—**Miller** (F.) Should women be dentists? Dental Rec., Lond., 1896, xvi, 155-161. [Discussion], 173-175.—**Mills** (W. A.) Specific treatment of necrosis of the alveoli and maxillæ with aromatic sulphuric acid. Am. J. Dent. Sc., Balt., 1896, 3. s., xxx, 17-21.—**Morton** (W. J.) Cataphoric medication of the mouth. Dental Cosmos, Phila., 1896, xxxviii, 401-413.—**Moskovitz** (I.) [Case of scleroma of the throat.] Orvosi hetil., Budapest, 1896, xl, 185.—**Neeley** (J. H.) Hæmophilia. Dental J., Ann Arbor, 1896, v, 71-73.—**Nehring** (A.) Ueber einen Menschlichen Molar aus dem Diluvium von Taubach bei Weimar. Verhandl. d. Berl. Gesellsch. f. Anthrop., 1895, (573-578).—**Newton** (R. C.) What shall be done for the teeth of the poor? Dental Cosmos, Phila., 1896, xxxviii, 385-389.—**Nux** (L.) Prothèse immédiate; nouveaux procédés pour la fixation des appareils. Odontologie, Par., 1896, 2. s., iii, 146-149.—**O'Conor** (J.) Excision of the tongue for cancerous disease. N. York M. J., 1896, lxiii, 511.—**Ottofy** (L.) The preservation of the deciduous teeth by means of caps and crowns. Dental Cosmos, Phila., 1896, xxxviii, 389-392.—**Palmer** (S. B.) Dental science then and now. Dental Pract. & Adv., Buffalo, 1896, xxvii, 10-21.—**Park** (R.) Double hare lip. Med. News, N. Y., 1896, lxviii, 523.—**Parmele** (G. L) Dental curios. Dental Pract. & Adv., Buffalo, 1896, xxvii, 61-66 —**Perkins** (G. W.) A case of sarcoma of the tongue. Ann. Surg., Phila., 1896, xxiii, 585-590.—**Phocas.** Urano-staphyllorhaphie. Nord méd., Lille, 1896, ii, 60-62.—**Poncet** (A.) Sarcome actinomycosique du maxillaire inférieur. Lyon méd., 1896, lxxxii, 13.—**Prosecutions** under the Dentists' Act. J. Brit. Dent. Ass., Lond., 1896, xvii, 231-243 —**Pye Smith** (R. J.) The growth of analgesia, antisepsis, conservation and prophylaxis in general and dental surgery. *Ibid:* 220-227.—**Quackenbush** (C. A.) Dentistry in the United States. Dental J., Ann Arbor, 1896, v, 74-77 —**Reboul & Schwartz** (E.) Restauration d'un bec-de-lièvre bilatéral. Odontologie, Par., 1896, 2. s., iii, 149-151.—**Reynier.** Des parotides infectieuses. Repert. de thérap., Par., 1896, xiii, 104-106. —**Riesmeyer** (L. T.) An unusual case of erysipelas. [pharynx.] Med. Rev., St. Louis, 1896, xxxiii, 309.—**Ross** (A. O.) A method of treating fracture of the inferior maxilla. Ohio Dent. J., Toledo, 1896, xvi, 217-221.—**Rostovtseff** (M. I.) [On black hairy tongue.] Bolnitsch. gaz.

Botkina., S.-Peterb., 1896, vii, 156; 182; 207; 226.—**Rotgans** (J.) Intra-buccale bovenkaak-resectie. Nederl. Tijdschr. f. Geneesk., Amst., 1896, 2. R., xxxii, pt. 1, 465-471.—**Sabbatani** (L.) Azione decalcificante del mercurio sulle ossa. Ann. di chim. e di farm., Milano, 1896, 4. s., xxiii, 49-60.—**Schmid** (Heinrich.) [1848-95.] (Nekrolog.) Cor.-Bl. f. Zahnärzte, Berl., 1896, xxv, 95.—**Schreiber** (M.) Ueber die Kieferklemme. *Ibid:* 103-109.—**Scott** (A. M.) The treatment of oral acidity, local and systemic. Dental Cosmos, Phila., 1896, xxxviii, 420-424.—**Shearer** (T. L.) Electricity in diseases of the pharynx. Homœop. Eye, Ear & Throat J., N. Y., 1896, ii, 39-48.—**Shears** (G. F.) Epithelioma of the lip with involvement of the inferior maxilla; excision, with plastic operation for repair of the defect. Clinique, Chicago. 1896, xvii, 247-249.—**Shield** (A. M.) A case of aneurism by anastomosis involving the vessels of the hard palate. Dental Rec., Lond., 1896, xvi, 204.—**Skinner** (F. H.) Gold fillings. Dental Rev, Chicago, 1896, x, 337-341.—**Smreker.** Ueber Glasfüllungen. Vrtljschr. f. Zahnh., Wien, 1896, xii, 78-82.—**Storey** (J. C.) First dentition, or teething babies, with some of the ills incident thereto. Texas Health J., Dallas, 1895-6, viii, 221-225. [Discussion], 234-240.—**Talbot** (E. S.) Dental and facial evidences of constitutional defect. Internat. Dent. J., Phila., 1896, xvii, 261-286.—**Tanzer** (F.) Ein Stück einer Prothese 12 Jahre im Verdauungstracte gelegen. Vrtljschr. f. Zahnh., Wien, 1896, xii, 61.—**Texier** (V.) Des végétations adénoides du pharynx nasal. Gaz. méd. de Nantes, 1895-6, xlv, 60-64.—**Thomson** (J. A.) As regards dentition: a notice of some new facts and theories. Veterinarian, Lond., 1896, 4. s., lxix, 263-269.—**Tims** (M.) The origin of mammalian teeth. Dental Rec., Lond., 1896, xvi, 164-171.—**Tomes** (C. S.) Notes upon dentine and enamel. Brit. J. Dent. Sc., Lond., 1896, xxxix, 337-349.—**Trattamento** delle stomatite. Gazz. d. osp., Milano, 1896, xvii, 260-263.—**Tuck** (W. R.) The reflex influence of alveolar lesions on the vocal cords. Lancet, Lond., 1896, i, 1348.—**Van Woert** (F. T.) Cataphoric medication in dentistry. Dental Pract. & Adv., Buffalo, 1896, xxvii, 66-69.—**Virchow** (R.) Ein aus Mammuthstosszahn geschnitztes Idol von Brünn. Verhandl. d. Berl. Gesellsch. f. Anthrop., 1895, (705).—**Whittles** (J. D.) Notes on fractures of the maxillæ and mandible. J. Brit. Dent. Ass., Lond., 1896, xvii, 199-212.—**Wild** (R. B.) Buccal syphilis. Brit. J. Dent. Sc., Lond., 1896, xxxix, 385-391.—**Wiley** (H. R.) Dental jurisprudence: evidence. South. Dent. J. & Lum., Macon, 1896, xv, 187.—**Williams** (J. L.) On the formation and structure of dental enamel. Lancet, Lond, 1896, i, 1203-1206.—**Wilson** (I. P.) Dental operations for women during the periods of menstruation and gestation. Dental Rev., Chicago, 1896, x, 346-351.—**Wilson** (N. L.) Chronic diseases of the tonsils. N. York M. J., 1896, lxiii, 509-511.—**Winkler** (G. H.) Medicinal prevention of dental caries. Dental Cosmos, Phila., 1896, xxxviii, 381-385.—**Woodworth** (F. J.) Local anæsthetics and obtundents. Dental Pract. & Adv., Buffalo, 1896, xxvii, 27-30.—**Young** (R. C.) Can the dentine be reached through systemic treatment? Dental Cosmos, Phila., 1896, xxxviii, 414-420.

◆

LIST OF UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING MAY, 1896.

May 5.—No. 559,404, to A. Rosenberg. Spittoon.
" " No. 559,426, to J. D. Wilkens. Dental engine.
" " No 559,511, to A. J. Burns and H. C. Reeves. Hot-air syringe.
" *12.*—No. 560,047, to M. L. Rowe. Disk-mandrel.
" " No. 560,092, to G. R. Ford and D. Alexander. Support for blow-pipes.
" *19.*—No. 560,312, to A. W. Browne and G. L. Harrison. Hand-piece.
" " No 560,315, to John W. Gilbert. Electric dental plugger.
" " No. 560,327, to J. E. Robie. Dental vulcanizer.
" " No. 560,419, to John Markowsky. Dental forceps.
" " No 25,523, to A. W. Browne. Design for base for chairs.
" *26.*—No. 560,663, to T. I. Wallas. Tooth or other brush.
" " No. 560,702, to J. P. Flaherty. Dental matrix.

about one-third of the four-ounce bottles in which it is sold is useful; the remainder is usually so deteriorated as to be worthless. Dilution with hot water and warming the solution restores its appearance, but for dental purposes not its virtues. The model, after investment, and also the teeth and entire investment, are freed of adherent wax by pouring over them a stream of *boiling* water. The excess of water is absorbed by means of bibulous paper. As soon as the wet appearance disappears from the plaster, it is ready to receive the silicate, not before.

A camel's-hair brush, having a fine point and no loose hairs, is dipped in the solution and the surplus wiped off the brush. The plaster surfaces, all of them, are painted lightly with the silex, carefully avoiding contact with the porcelain or platinum pins. By means of the fine point on the brush the matrix of the rim is painted between the teeth; in coating the cap side of the investment, much care is required to prevent touching the teeth. Small wisps of bibulous paper are quickly and gently passed over the painted surfaces until there is but a thin glaze covering every part of the plaster. The pieces should be set aside for at least fifteen minutes, to permit thorough hardening of the silex. After vulcanizing the flasks should not remain unopened over night, for if salt (sodium chlorid) has been used to hasten the setting of the investment, the surface of the vulcanized plate will be covered by a hard and tenacious gloss; if opened as soon as cold the plaster and silex part from the vulcanite, without even washing, leaving a smooth, glazed surface equal to that found under tin foil.

The mechanic may be certain that the lack of good results is due to either carelessness or faulty silex.

This is an important matter, as unquestionably many or most of the ills attributed to the wearing of vulcanite plates are due to roughness upon their palatal surfaces.—H. H. BURCHARD.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

The abbreviations of titles used are those common to bibliographical work, and will, it is presumed, be readily comprehended by any one familiar with dental or scientific publications. Any explanation will be gladly furnished by the compiler. A star (*) indicates a Thesis.

Abbott (Frank.) Dental pathology and practice. Philadelphia, 1896, S. S. White Co., 240 p., 3 pl. 8°.

Bödecker. Die Anatomie und Pathologie der Zähne. Wien u. Leipzig, 1896, W. Braumüller, 671 p. 8°.

Frey (Léon.) * Monographie de la dent de six ans. Paris, 1896, Soc. d'éd. scient., 80 p. 4°.

——— Pathologie des dents et de la bouche. Paris, 1896, J.-B. Baillière et fils, 274 p. 8°.

Miller (W. D.) Lehrbuch der conservirenden Zahnheilkunde. Leipzig, 1896, G. Thieme, 416 p. 8°.

Richter (Erich.) Zahnärztliches Adressbuch für Deutschland, Oesterreich-Ungarn, Schweiz, Dänemark, Schweden, Norwegen, Belgien, Niederlande, Russland und den Orient. VIII. Jahrgang für 1896. Berlin, 1896. 8°.

Sauvez. Anatomie et physiologie de la bouche et des dents. Paris, 1896, A. Maloine. 16°.

mortem. We cannot study a living pulp under a microscope, while after its removal from a tooth the conditions are entirely changed.

Much, however, can be learned from the teeth after extraction. The practice of some who refer all cases of extraction to other parties deprives them of many opportunities for observing facts and conditions that would add greatly to their knowledge, and be of inestimable value in their experience.

In this paper I shall only take up a few of the different pathological conditions of the teeth, and will endeavor to make clear some of the facts by which we differentiate in their diagnosis.

The dental pulp is subject to many different pathological conditions; yet withal there is no difference in the characteristic symptoms, and I do not know of any means by which we can differentiate in their diagnosis. Special attention the past year has been called to the study of calcification of the pulp, which appears in several different forms and is of frequent occurrence. As yet we are unable to discover it until we have opened into the pulp-chamber, or examined the tooth after extraction.

The pain resulting from the disturbances of the pulp is so decided in its characteristics that I shall speak of it as a *pulp pain*. It is a sharp, lancinating pain, sometimes throbbing, paroxysmal, intermittent, and often decidedly neuralgic. The patient is seldom able to assist us in locating the tooth from which this pain proceeds. If the patient had always been under one's charge, his records would probably be of assistance in forming a diagnosis. Throwing a jet of hot and cold water alternately upon the teeth, often will help us to locate the offending pulp. Occasionally there will be a slight inflammation of the pericemental membrane; gently tapping the tooth manifests a slight tenderness. Neuralgia is often a result of the affections of the pulp, and often is the only symptom given. As a rule, in cases of neuralgia, when there is pain in the ear, we may pronounce it as of dental origin. However, in all cases of neuralgia we must take into consideration the temperament, health, and natural tendencies of the patient to neuralgic affections. The pain resulting from hypercementosis, of which I shall speak later, is similar in many of its characteristics to that of the pulp pain, though we do not get the throbbing, but more of its neuralgic character.

The characteristics of the pain resulting from pathological conditions of the pericemental membrane bear a very marked contrast to the pulp pain, it being a dull, steady, heavy pain, seldom of a neuralgic character, and can always be located by pressure on the offending tooth. A slight tapping shows decided tenderness.

In considering the etiology of the pathological conditions of the pulp we find they have resulted many times from operative procedures, as evidenced by the fact that many cases of pulp-disturbance follow the filling of small cavities. For many years "the conservative treatment of the dental pulp" was a prominent subject before the profession, and very generally practiced. Capping of exposed pulps was the rule which more often resulted in failure than success, and in many cases of apparent success they have been so for a few years only. The theory of many has been, that the capping would cause a secondary deposit of dentine, thus protecting the pulp. In many of these cases the deposit has been in the shape of pulp-nodules and other forms of calcifications, thus causing the opposite result, its own destruction.

Occasionally a patient presents who is suffering intense pain, wherein we can detect the characteristics of both the pericemental and pulp pain. A correct diagnosis is difficult in cases of this description. As a rule, when we are confronted with this condition we may safely affirm that there are other teeth involved than those that are tender on percussion. A case to the point illustrating this condition is the following :

Mrs. T. came in on a Saturday morning, requesting me to extract the right superior second bicuspid, having suffered all the previous night from toothache, and locating the pain in this tooth. She said this tooth had given her a great deal of trouble. The pulp had been destroyed, and tooth filled about four years ago, and since then, at four different times the filling had been removed and tooth treated, and then refilled, and had given a great deal of trouble since the last time it was refilled. On examination I found a large gold filling in the superior first bicuspid, mesial approximal cavity, no tenderness on percussion. Second bicuspid tender on percussion, large cement filling, mesial approximal cavity. First molar, slight tenderness on percussion, large cement filling, mesial approximal cavity. The second bicuspid on inferior jaw quite tender on percussion, large cement filling, distal approximal cavity. The character of the pain showed decided symptoms of pulp-irritation accompanying the dull heavy pain of pericemental inflammation.

As she could not give any history as to the treatment the other teeth had undergone, I first opened up the inferior second bicuspid. I found the pulp had been removed and canals filled, and on account of the extreme tenderness I decided it best to remove the filling from the canal and drill through apex. Then in an endeavor to find the pulp-irritation I removed the filling from the superior first molar, and found pulp nearly exposed ; an application of creasote and cocain quieted the pain. Concluding this tooth was the one from which the pain proceeded, I removed the pulp, using cocain, and filled the canals. In about half an hour the pain returned. I applied aconite, iodin, and chloroform to the gum over the molar, and prescribed three doses, five grains each, of antikamnia, taken an hour apart, and then dismissed her. At five P.M. she returned, there having been no abatement of pain. At her earnest request I extracted the superior second bicuspid, though assuring her I was confident it would not relieve the pain.

The next day (Sunday) they sent for me, and I found her suffering from the same pain and having passed another sleepless night. The parts about the inferior bicuspid were very much swollen. I ordered local applications and sent for her physician, requesting him to administer morphin that she might get some sleep through the night.

Monday ; patient in bed, no abatement of pain, and face badly swollen from the inferior tooth. I cut through the gum and alveolus to apex of root, ordered hot applications in the mouth, and the morphin to be taken at night. Tuesday, patient in bed, no abatement of pain, swelling increasing ; ordered the hot applications continued, also the morphin.

Wednesday, no abatement of pain, though the swelling was decreasing ; there had been no formation of pus. I found a slight tenderness on tapping the superior first bicuspid. I immediately sent to my office for the engine, and drilled out the gold filling in this tooth. The conditions under this filling accounted for all the trouble and pain she had suffered the past four years. This filling had been placed almost on the pulp. I found the body of the pulp dead, also the palatal canal, but alive in the buccal canal. I injected cocain and removed the pulp from this canal, and the severe pain ceased at once. The patient made rapid recovery. This was a handsome gold filling, and I could hardly believe any one would be so careless in doing such a fine piece of work. The result showed that her dentist had been removing the filling and treating the canals of the second bicuspid, for the trouble he should have known was caused by his gold filling.

After the death of the pulp,—and it may be immediate or remote,—we have an inflammation of the pericemental membrane, which results in *alveolar* abscess. This is a term which is generally accepted as meaning an abscess within the alveolus that always has its origin at the apex of the root of a tooth, and is caused by a dead or putrescent pulp, or is the result of infection through the pulp-canals. An abscess may form within the alveolus as the result of other irritants, and I will consider this later, but it is not what we term an alveolar abscess. Of the etiology, pathology, and treatment of alveolar abscess we have a better understanding than of any other pathological condition—excepting caries—that we are called upon to treat, and there is no excuse for the many blunders and failures that are of every-day occurrence. The term "blind abscess" is frequently used, and many of the profession believe in the existence of such an abscess; meaning, as I understand it, to be an abscess already formed but dormant, liable at any time to a violent outbreak. I formerly took it for granted that there were "blind alveolar abscesses," because everybody said so. I now do not believe there is such a condition. The term *abscess* means "a circumscribed cavity containing pus." If an abscess exists, it either has an opening or is intent in making one, and thus cannot be a "blind abscess."

One important symptom by which I have at various times diagnosed an alveolar abscess when there seemed to be no other symptom, is the peculiar odor from the patient's mouth. I cannot describe it, but there is no mistaking it.

Pyorrhea Alveolaris.—The prominence given the past two years to the study of this disease gives promise of bringing to light many hidden mysteries. As yet we have only learned that it originates from different causes, but we have not learned how to differentiate in our diagnosis, save in a few of the different phases it assumes. The past winter many dental societies have been discussing the question whether there can be an alveolar abscess without the death of the pulp. In March, 1887, I read a paper before the New York Odontological Society, which was published in the DENTAL COSMOS of the following June. In this paper I took the ground that we cannot have an alveolar abscess on a tooth with a living pulp, and the discussion that followed conceded the position taken.

To differentiate between an alveolar abscess and an abscess caused by "calcic inflammation of the peridental membrane" is somewhat difficult. Note first the tooth, its appearance and translucency, the size if any of a filling, its response to the hot and cold water tests, its history, and then note surrounding teeth.

Hypercementosis, commonly called exostosis, is of frequent occurrence, creating more or less of disturbance, and exceedingly difficult of diagnosis. In considering its etiology, we find it results from various causes,—viz, a slight irritant at the gum margin, excess of function, loss of antagonist, irritation of the pulp, crowded condition in the arch, and the claim is made by some that the irritation of an alveolar abscess will cause the growth.

The symptoms are identical with those of pulp-irritation, pain ranging from a slight discomfort to severe paroxysms; severe neuralgia, and often, if the patient is able to localize it, the area includes several teeth. Seldom can it be localized as from one tooth. It is a cause of sympathetic pains and disturbances in other organs which themselves may be free from any local disturbing influences. There are on record cases of epilepsy being cured by the extraction of teeth, on the roots of which were found this growth, and there is a case reported in the third volume of the COSMOS "of a gentleman who had suffered for many years from what was supposed to be neuralgia, which finally produced insanity. While insane a tooth was extracted whose roots were largely hypertrophied, although the crown was sound. The neuralgia immediately ceased, and the patient was soon restored to health."

A number of cases of this trouble have come under my observation.

Case of Miss B. This lady came to me while I was a student in college. This tooth was the first inferior right molar. I filled both the mesial and distal approximal cavities with gold, using the Bonwill mechanical mallet, that had been left at the college for the students to try. Some three months afterward she began to have neuralgic pains on that side of the face which constantly increased, and she was soon able to locate the pain in this tooth. After endeavoring to relieve the pain by local applications, I removed the mesial filling,—this was about eight months after it was filled,—and for two weeks made applications to the cavity; the pain continuing, the pulp was then devitalized and removed. After several weeks' treatment and no abatement of pain I extracted the tooth, which required considerable effort, and fractured one of the roots. This is one of my most valued specimens, as it is the only one of which I know its whole history. It shows hypercementosis on each root. I have spent many hours over this specimen, studying cause and effect, and it is my opinion that the severe hammering this tooth received with the mechanical mallet was the cause, and hypercementosis the result.

Case of Mr. J. C. This tooth was the inferior right second bicuspid. This patient came in last January complaining of severe neuralgia on that side of the face, which had been constant for the past three days. Inquiring its history, I found the trouble first began some three months previously and was very intermittent in its character, the attacks at times occurring in severe paroxysms. Occasionally the pain could be located in this tooth. On examination I found the tooth had no antagonist in the superior jaw, it having been extracted about eighteen months. All the teeth on that side were equally responsive to the cold and hot water test. After studying the case for about fifteen minutes I told him I would remove this tooth, that we would find an enlargement on the root which was causing pressure on the nerves I injected a four per cent. solution of cocain, and painlessly extracted the tooth. The result showed my diagnosis to be correct; there has been no recurrence of the neuralgia. In this case I based my diagnosis on the character of the pain, and the fact of the tooth having no antagonist.

Case of Mr. K. This tooth was the left inferior third molar. The patient came in last November complaining of severe neuralgia, which had been almost constant for the past six years. He had consulted both dentists and physicians and received no help. On examination I found this tooth standing at an angle, only two-thirds of the crown above the gum, the anterior cusps below the gum and pressing against the second molar in front. Inquiring into the character of the pain, which has been more severe the past four weeks, I found, besides the neuralgia, there were also marked characteristics of pulp pain. I at once diagnosed it as hypercementosis and advised extraction, which was submitted to. The result shows a correct diagnosis, and there has been no recurrence of the neuralgia.

Case of Mr. H. B. This patient came in last December to see if anything could be done to relieve a severe neuralgia, located in the inferior incisor teeth, from which he had suffered the past eight years. The right inferior cuspid had projected in front of the other teeth; on account of the annoyance it caused, he had it extracted about nine years ago. According to his account, it was a difficult tooth to extract, and his whole jaw was lame and sore for a long time afterward. The neuralgia commenced about three months after the tooth was extracted, and was more severe in winter than in summer. The incisors were extremely sensitive to cold air, and he had come to the conclusion to have them extracted when some friend had advised him to consult me. I took an impression of each jaw, and made an appointment for two days later. When he returned I told him I wanted to extract the right first bicuspid; that we should find a growth of bone on the end of the root, and that this growth was the sole cause of his neuralgia. He yielded at once to my advice, and the tooth was removed. The result confirmed the diagnosis; there has been no recurrence of the neuralgia, and the extreme sensitiveness of the incisors gradually passed away. Observing the casts, you will notice that all the teeth of the inferior jaw, with the exception of this bicuspid, antagonize with those of the superior jaw. On first examining the casts after placing them on the articulator, I thought the excessive pressure on the inferior incisors was the cause of the trouble, and began to study ways to relieve it. Continued study of the casts and taking into account its history, viz, that the neuralgia commenced a few months after the extraction of the cuspid, I arrived at the conclusion that the violence of the extraction of this tooth was the excitant irritant that influenced the growth of cementum on the first bicuspid, which was the only tooth on the inferior jaw that had no function.

To enumerate the symptoms by which we can diagnose hypercementosis:

First. The offending tooth must be on the same side as that on which the pain is located.

Second. We must have as complete a history of the case as possible.

Third. Note the articulation, whether there is excessive, or lack of function.

Fourth. Examine carefully for cases of pulp-irritation, and note the condition of third molars. After satisfying ourselves that the pain cannot be caused by either of these conditions, we may pronounce it hypercementosis.

Fifth. Concluding the pain to be caused by pulp-irritation, as noted by the cavities or fillings,—having devitalized the pulp and filled the canals,—the "pulp pain" continuing, we may conclude it is a case of hypercementosis.

Treatment. There is no remedial or palliative treatment. The tooth must be extracted.

The efforts put forth in this paper and the limited ground I have been able to cover illustrate how broad is this subject and what a wide field is open for discussion.

As we note the limit to which our knowledge of "differential diagnosis" extends, we can but realize that it is along these lines advance must be made in the future; and I would urge as the motto for each one to adopt that which comes to us each month on the cover of the DENTAL COSMOS,—"*Observe, compare, reflect, record.*"

FOETOR EX ORE. PATHOLOGY AND THERAPY.

BY H. JEROME ALLEN, M.D., D.D.S., WASHINGTON, D. C.

(Read before the Washington City Dental Society, May 19, 1896.)

ONE of the most disagreeable features of dental practice is the occasional case of fœtor ex ore which presents only too frequently. Such cases are the more unbearable since they are almost invariably curable.

When the usually simple causes and the disagreeable and at times dangerous effects are considered, it behooves every dental practitioner to have an intelligent and comprehensive idea of all the causes which tend to its production, and of all the possible means of its prevention. Marked changes in the breath have heretofore received but little consideration from both the medical and dental professions. Our medical text-books contain no more than an occasional allusion to its existence, while, strange to say, the dental text-books ignore the subject almost entirely.

The affection derives its importance from the fact that it is a constant source of annoyance to all who by force of circumstances are compelled to associate with the unfortunate sufferers. And such is the universal false kindness of their relatives and friends that, with the best intentions in the world, they would rarely whisper to them a word of their disorder or suggest a source of relief. In view of this widespread habit, it becomes the plain duty of the dental practitioner to inform his patients of any marked disorders of the breath, and to suggest the appropriate local remedy or to refer them to their physician for constitutional treatment.

Following is an attempted succinct account of the various diseased conditions in which a fetid breath is the most prominent symptom.

An offensive breath is a functional disorder liable to occur at all periods of life. Men are more subject than women, on account of their irregular habits and diet. It is an important and characteristic symptom of many morbid conditions found in the nose, mouth, throat, chest, and stomach, and varies from the slightest perceptible deviation from the normal condition to that in which the fetor produced by the excrementitious matter is intensely disgusting. In the oral cavity itself, decayed teeth, accumulations of calculus, and diseases of the gums and maxillary bones and of the mucous membrane are the most frequent causes of this offensive condition.

There is a tendency among the laity to ascribe to decayed teeth all fetor emanating from the oral cavity ; and while these are undoubtedly very active agents in the production of offensive odors, still the more lasting and persistent odors are due to the chronic and exudative diseases of the gums, bones, and mucous membranes.

A case of simple, catarrhal, or ulcerative stomatitis will produce an odor characteristic of and varying in intensity with the amount of inflammation present. The discharge from the sockets of the teeth and the margins of the gums in pyorrhea alveolaris is always offensive in a greater or less degree. The discharge from an alveolar abscess will taint the breath as long as it is allowed to exist, while necrosis and sloughing of either the bony or soft oral tissues will always produce a very offensive condition. And finally, the most fruitful source of offensive oral odors is found in the decay of foreign matter within the interstices of the teeth and the accumulations of soft salivary calculus and mucus.

Various alimentary substances find a lodgment in the interstices about the mouth and teeth, and, unless removed in time to prevent fermentative changes, are certain to present putrefactive odors to the currents of air as they pass and repass in talking.

As all the conditions herein cited are localized within the oral cavity, their treatment lies solely within the domain of the dental surgeon. To here suggest therapeutic measures in more than a general way for these common conditions would be superfluous and unnecessary, in view of the present state of the dental materia medica. In all cases, however, the object to be obtained is the perfect purification of the oral cavity in the most thorough manner by the entire removal of all offensive material, the radical treatment of all diseased processes, and the intelligent use of deodorants, antiseptics, or disinfectants as indicated.

The next most potent factor in the causation of this disorder is disease of the nose and throat in all of its chronic forms and in many acute cases. Chronic catarrh and a chronic inflammation of the pharynx, tonsils, and bronchial tubes all result in a more or less disagreeable fetor.

The odor accompanying chronic nasal catarrh is so characteristic that we may often decide the diagnosis without an examination, but before suggesting any treatment we should be careful not to confound this disease with chronic lacunar tonsillitis. The odors accompanying both of these diseases are in the more sthenic cases alike in their disgusting intensity, and in all cases a careful examination is the best guide to a positive diagnosis. It becomes the absolute duty of the dental surgeon to differentiate between these two diseases, and to advise the patient of the proper means of relief.

Although a radical cure for a deep-rooted case of chronic catarrh in which structural changes have taken place is practically impossible in the majority of cases, still chronic lacunar tonsillitis, with its accompanying vile odors, may be instantly and radically cured by the ablation of the diseased tonsils. Thus it is possible for the dentist to suggest at times a cure that gives instant relief and is practically harmless, while in the more hopeless cases of chronic catarrh he can, besides referring his patient to the physician, at least advise deodorant and detergent douches, which the patient's relatives and friends will thoroughly appreciate.

The diagnosis of chronic tonsillitis is made easy by the invariable appearance of white patches on one or more lacunæ. The contents of these lacunæ consist of whitish, stinking plugs, the hardened products of inflammation or particles of food which lodge in the crypts and there decompose. They often produce an intolerable fœtor ex ore, and a number of patients suffer in consequence from antipathy to food and from gastric and intestinal catarrh. All these symptoms disappear promptly after the removal of the primary disease.

The odors attending nearly all acute diseases of the mouth, nose, throat, and chest result more from lack of cleanliness in neglecting to remove the accumulations of salivary calculus, decomposing food débris, and exfoliated mucous membrane than from any pathological condition. Therefore the treatment for all such conditions is simple cleanliness and the enforcement of the proper prophylactic measures.

Disease of the larynx is, as a rule, productive of no characteristic odor.

Disease of the bronchial tubes and lungs, of almost every variety, affects the condition of the breath more or less.

Putrid bronchitis is the one disease of the chest worthy of especial mention as productive of exceedingly disagreeable odors.

Constitutional treatment with appropriate local measures are indicated, and further than these indications the case is beyond the province of the dental surgeon.

Any acute or chronic affection of the stomach, alimentary tract, liver, kidneys, or skin is almost certain to result in more or less marked change of the breath, from the fact that the waste that fails to be removed by the defective organ is thrown into the lungs, and will, in many instances, produce a disagreeable fetor of the breath. Especially does any defect in the functions of the digestive apparatus almost invariably manifest itself as a source of this disorder.

Just what effect upon the stomach is produced by the constant swallowing of bacteria and pus from diseased teeth, mingled with decomposing particles of food, we are unable to determine, but it is reasonable to suppose that gastric disturbances are greatly aggravated, if not induced, by so doing.

Finally, it may be stated as a general proposition that any morbid condition of the system which prevents the elimination of metamorphosed nitrogenized material, or retards the passage of decomposing waste matter through the intestines, will produce a fetid breath.

Therapy.—As the cause of about four-fifths of all cases of fœtor ex ore is located within the oral cavity, it becomes apparent that the disorder in many cases may be entirely obliterated by appropriate local treatment only. All pulpless teeth and cavities should be treated and filled, all accumulations of calculus and foreign matter thoroughly removed, and any existing disease of the gums or the mucous membrane radically treated. These measures, together with an antiseptic mouth-wash, will be found efficacious in the great majority of cases.

Many formulæ have been given for the correction of a fetid breath, but in the majority of cases the causes have been overlooked, and the treatment administered on a false basis, resulting in temporary relief only, and the substitution of one odor for another. Invariably must the cause be removed before we can hope to attain permanent results. And granted the removal of the primary cause, then comes the intelligent use of medicinal agents to prevent its return and to maintain the normal condition.

Antiseptics are first upon the list, and of these it is our duty to select such as are more pleasant to use, essential qualities being equal. Notably among these may be mentioned carbolic acid, bichlorid of mercury, salicylic acid, oil of eucalyptus, benzoic acid, boric acid, permanganate of potassium, peroxid of hydrogen, listerine, borolyptol, and a solution of the antiseptic tablets prepared after the formula of Dr. Carl Seiler. Nearly all of these, when brought into contact with disease-germs, destroy their vitality by arresting fermentative processes and preventing the decomposition of organic substances.

In personal practice, a solution of permanganate of potassium (five grains to an ounce of water) has proven very efficacious as a rapid deodorizer. In this respect it is superior to almost any other agent for quickly producing a temporary effect, sufficient for the comfort of the operator during a sitting. In the presence of any disorganized organic matter, permanganate of potassium will turn from a bright purplish red to a dirty brown color. Therefore this agent, in addition to peroxid of hydrogen, can be relied upon as a faithful detective of effete matter.

A solution of the tablets prepared by Parke, Davis & Company after the formula of Dr. Seiler deserves high rank as a mouth-wash and deodorizer. Its efficiency is at once apparent by a glance at the formula, which is as follows. Each tablet contains—

Sodium bicarbonate, 5 grs.;
Sodium borate, 5 grs.;
Sodium chlorid, 5 grs.;
Sodium benzoate, 7-24 gr.;
Sodium salicylate, 7-24 gr.;
Oil eucalyptus, 7-48 min.;
Thymol, 7-48 gr.;
Menthol, 7-96 gr.;
Oil gaultheria, 7-96 min.

These tablets are put up in convenient form to be dispensed to patients, and prescribed, in the proportion of one tablet to two ounces of water, form a mouth-wash unsurpassed for efficiency. In many cases where the indications permit, it is well to advise, in addition to such an inhibitory antiseptic, a germicidal solution of a positive value, such as bichlorid of mercury from 1 to 2000 to 1 to 10,000.

Both listerine and borolyptol deserve mention as pleasant and efficient detergent preparations.

Of the other therapeutical agents mentioned, each has a limited field of application, and, as a rule, are to be used only upon the appearance of the proper indications.

In those cases in which the disorder is consequent upon some constitutional derangement, it is well to advise, in addition to the appropriate local treatment, some legitimate means of blood-purification. The functions of excretion should be encouraged up to the point of free activity, as it is more than likely that one or more of them are sluggish and do not withdraw the requisite amount of waste material from the system. The diet also should receive careful attention, and all existing irregularities corrected. Any anemic condition should be overcome by the administration of some preparation of iron in combination with nutrient tonics; and, finally, the proper hygienic surroundings should be insisted upon as one of the most important factors of restored health.

THE VARIATIONS OF THE TEETH IN RELATION TO TEMPERAMENT.

BY ALTON H. THOMPSON, D.D.S., TOPEKA, KAN.

(Read before the Interstate Dental Meeting at Excelsior Springs, Mo., June 25, 1896.)

NATURE never duplicates. Types persist, but the individuals vary from zero to infinity. Within the bounds of species the differences are so numerous and varied that no two specimens of any species of animals, plants, or even minerals, are precisely alike. Indeed, the individual is unlike in the two halves of the organism,—as in man where the right and left sides, limbs, organs, teeth, and other parts are often quite dissimilar in size and form, so that asymmetry is the rule and not the exception. The prevalent and general dissimilarity between individuals of the same species extends to all parts and organs, so that anatomists are accustomed to vagaries and irregularities. They have come to regard a perfectly symmetrical organ of typal completeness as a rarity and a thing of beauty ; and a typically formed individual, perfect in all parts, is a *rara avis* indeed.

It is a conspicuous fact that animals low in the scale of organization, in which function is undifferentiated in greater or less degree, present less variation among the individuals of a species than those of higher organization. For instance, fishes and reptiles are of low organization and are less specialized in all parts than mammals. But while their general organization is more flexible and susceptible to variation, the differences between the individuals are not so marked as in the higher vertebrates. Thus the differences between one fish or one snake and another of the same species are not so marked as those between one horse, or dog, or cow and another of the same species. This variation as between higher and lower organizations is due to inherent qualities of, first, greater generalization in the lower organization which causes prevalent resemblance among all specimens, and, second, greater specialization and differentiation in the higher organisms which causes dissimilarity and variation in the individuals. We observe also that there is a difference in the degree of variation as between the high and low races of the same species. Thus there is less difference between the individuals of the wild wolves and other canine animals than between those of the domesticated dog ; or between wild cattle or horses than the domesticated varieties ; or between the low uncivilized races of man than those that are higher and civilized. Elevation produces variation among the individuals of species with the tendency to the formation of distinct types which become more or less permanent sub-species. We observe further that while individuals vary infinitely, types persist and are transmitted from generation to generation. We see no two among the millions of men who are precisely alike, yet we readily recognize types which are familiar, and into which we can classify individuals as we meet them. So in regard to mankind as in other fields of nature, the individual is nothing, and may come and go in millions and leave no mark. Like the waves on the bosom of the great ocean, singly they are nothing, but in the aggregate they give birth to types, and from types are deduced laws, and laws represent the activities of the universe and state the conditions of life.

TEMPERAMENT.

It had been noticed by the ancients that the individuals of the human race presented great variations among themselves, and they proceeded to classify these variations with a view to the diagnosis of types. They observed that the functions of life were not performed with the same degree of force or rapidity, and that physical and mental characters varied in different individuals, etc. ; and these varying conditions they called the *Temperament* of the individuals,—the *corpora habitus*,—which may be defined as a particular state of the constitution depending upon the relative proportions of its different masses and the relative energy of its different functions. It is by the combination of these constitutional elements in various proportions that the body is *tempered*, the predominating element determining the *temper* or *temperament*.

"But it must be apparent that, in their ultimate analysis, the temperaments must be as numerous as the individuals of the human race,—no two persons having precisely the same physical organization." (Jacque.) Thus we observe the great variation as found between individuals as we meet them, yet they can all be classified under types which represent the predominating condition or temperaments governing their organizations. A particular temperament is the result of the predominance of one element over the others which are present also in greater or less degree. Theoretically, if all the elements were present in equal proportions we would have the balanced or harmonious temperament, for when all the temperaments are mixed in equal degree, the complete organization is attained and the highest perfection is reached. This is the balanced temperament to which the ancients, assuming the possibility of such cases, gave the name *temperamentum temperatum*,—the temperate temperament,—in which all the constitutional elements are in perfect equilibrium. This is constitutional perfection, but it is never entirely attained. We can hardly conceive of such a perfect equilibrium of all the parts or elements, but we sometimes see individuals in whom this condition is approached in rare instances, of whom we speak as being "well balanced," both mentally and physically, but this is rarely even approached.

But to classify our subject briefly, we will proceed first to

A Diagnosis of the Temperaments.

The following signs may be taken as indicating the main characteristics of the leading temperaments by which the most prominent temperament of a person may be recognized,—or the binary combination that is most marked, when a dual organization is present.

We will employ for our indications the descriptions given by Dr. D. H. Jacque in his work on "The Temperaments" (p. 45, et seq.), following that proposed by Spurzheim in his "Physiognomy," etc. (1836, p. 191), which was founded on the classification originally employed by the ancients and first systematized by Herodotus. Dr. Jacque gives preference to his later classification of the (1) Motive, (2) Vital, and (3) Mental temperaments, with their variations, which include the divisions of the older classification. But as the latter is better understood and more popular, to avoid confusion we will employ it for our present study.

The Signs of the Basal Temperaments.

(1.) *The Lymphatic Temperament.*—This temperament is based on the predominance of the lymphatic system, and is characterized by a stature above the medium; fullness of body amounting to corpulence, owing to the activity of the lymphatic system; softness and flabbiness of flesh; contours full but without grace or beauty; articulations voluminous but badly formed; extremities large and ugly; features full, heavy, and expressionless; the cheeks pendent and the lips thick; skin a dull leaden-white, faded or yellowish, and generally cold and moist; hair fine, silky, and soft, but lusterless. Jacque calls this an abnormal temperament.

(2) *The Sanguine Temperament.*—This variety is marked by the

predominance of the arterial system. It is replete with vigor and the healthful activities. There is a stature generally above the medium; a well-proportioned body; the muscles and bones formed for elegance and activity rather than for strength. The skin is fine, soft, pliable, and transparent; the complexion ruddy and fresh; the hair blonde, red, or chestnut,—rarely dark. The face is inclined to roundness; the lips are full and red, and the eyes blue, brilliant, and expressive; the pose of the body is natural and dignified, and the movements graceful, easy, and precise. This splendid organization is characterized by vigor, warmth, and functional activity. This is the vital temperament of Jacque.

(3.) *The Bilious Temperament.*—This temperament is characterized by a medium or tall stature; a somewhat angular configuration; strongly defined muscular development; a strong frame; a lofty, if not audacious, bearing; abrupt, energetic, and expressive gestures; a measured walk, and a serious if not somber expression. The skin is rather coarse and dry; the complexion olive, tawny, or dull; the eyes black or brown, and the hair dark, often black,—strong and abundant. The venous predominates over the arterial system; the excess of bile secreted shows that the liver is the predominating organ of the digestive and nutritive system. It influences the whole organization and constitutes a distinct physical basis. This is the motive temperament of Dr. Jacque.

(4.) *The Nervous Temperament* is a more or less abnormal constitutional condition, and is sufficiently common in this age and in this country as to be readily recognized. It consists in the excessive development and morbid activity of the nervous system, although the brain, taken alone, is not always necessarily either large or particularly influential,—the nervo-ganglionic system being the chief seat of this constitutional condition. The physical indications of the nervous temperament are: a stature below the medium; a slight frame; habitual emaciation due to weakness of the nutritive system; a marked predominance of the nervous over the muscular system. The head is relatively large, and there is more or less marked disproportion between the cranium and the face. The skin and hair are fine and soft; the eyes often gray and very brilliant; the complexion pale and sometimes sallow; the movements rapid and often irregular and convulsive; the expression intelligent and vivacious. Dr. Jacque considers this one of the abnormal temperaments, but its characteristics must be recognized even though its tendencies may be pathological.

The basal temperaments never occur, however, in any one individual alone without admixture of other elements in greater or less proportion. These are sub-classes of the four bases, of mixed temperaments, combinations of the primary divisions. In these combinations one or more of the so-called basal temperaments predominates, and a compound term is used to express the complexity. The compound or binary temperament is most common in which two of the basal temperaments are well marked, with which may be characteristics of one or two others combined in greater or less degree. The two leading bases name the compound,—as the sanguino-bilious or the bilio-lymphatic, etc. The names of these compounds are sufficiently indicative of their characters as combining the leading features of the two bases named. The list of the double compounds extends throughout the entire series of the temperaments in all possible combinations. But to these binary compounds are usually added touches of other temperaments also in varying proportions, although tertiary combinations cannot be positively diagnosed or described. Therefore we must content ourselves with going no further than the binary combinations.

THE TEMPERAMENTAL CHARACTERISTICS OF THE TEETH.

As other parts of the human organism are profoundly affected by the influence of temperament, it is to be expected that the teeth would also follow the rule and exhibit features characteristic and indicative of the temperaments. Extensive study by careful observers has demonstrated this to be a fact, and significant signs have been noted and classified which are now known to accompany each temperament. These can be briefly catalogued as follows :

(1.) *The Lymphatic Temperament.*—The teeth of this temperament are large, ill-shaped, short, and broad ; the cusps low and obtuse ; the edges thick and rounded ; the enamel dull, waxy, and opaque in finish ; the coloring dull, muddy, pallid, and lusterless. The articulation loose and flat ; the arch large and round ; the vault low and flat ; the gum margins thick and loosely defined ; the color of the gum pale, and the texture soft.

(2.) *The Sanguine Temperament.*—The teeth are symmetrical and well proportioned, with curved and rounded outlines ; full round cusps and well-defined edges. The parts of the teeth are clearly marked. The enamel is brilliant and translucent, with a bisque-like finish. The color is rich cream, inclined to yellow. The articulation is firm and sharp ; the cusps interlocking well. The horizon of occlusion is inclined to curve, *i.e.*, to dip downward at the bicuspids and first molars. The arch is the round-square, the cuspids standing out at the corners sufficiently to give character to the arch ; the incisors describing a slight curve from cuspid to cuspid, and the bicuspids curving gracefully backward and outward from the cuspids. There is some tendency to irregularity, especially when crossed with the nervous temperament. The gums are of a good healthy pink color, clear and bright, the margins well defined, and the health-line well marked.

(3.) *The Bilious Temperament.*—The teeth are large and angular ; rather long than broad ; inclined to transverse lines ; the anatomical features of the crown strong ; the cusps and edges long and stout. The enamel is strong and thick, but rather dull, rough, and unpolished. The color is a strong bronze-yellow in various shades. The articulation is firm and close, and the cusps well locked. The plane is much curved, the dip being considerable. The arch is square, the cuspids standing out boldly at the corners ; the incisors line being flat and the bicuspid and molar line dropping straight backward from the cuspids. The vault is deep and square. The teeth are closely set, but there is not much tendency to irregularity. The gum is red and heavy, and the margins thin and congested.

(4.) *The Nervous Temperament.*—The teeth are marked by delicate beauty of form, but with lack of solidity. There is excess of length in proportion to width ; the cusps and edges being long, fine, and thin. The enamel is brilliant, translucent, and weak. The color is pearly blue, inclined to gray. The articulation is long and penetrating ; the line of occlusion very irregular. The arch is inclined to the "V" shape from contraction and weakness of the bones of the face. Irregularity of the teeth is prevalent in this class, and abnormalities of all kinds are common. The vault is high and contracted,—the "Gothic Arch" being the form of both the arch and the vault. The gums are thin, pale, anemic, and glistening ; the margins thin, pale, and loose.

The Binary Compounds.

The Sanguino-bilious.—The teeth are large, with strong edges and heavy cusps ; the color dark yellow, a combination of the characters of both bases.

The Sanguino-nervous.—The teeth are of varying size, shapely ; inclined to length with narrow necks ; brilliant enamel of bluish-cream color. There is much disposition to irregularity.

The Sanguino-lymphatic.—The teeth are of more than average size ; broad and well rounded ; color, cream-gray inclined to yellow, dull and opaque.

The Nervo-bilious.—The teeth are long and narrow, with long cusps ; the enamel polished ; the color a combination of bluish and yellowish shades in various degrees.

The Nervo-sanguine.—The teeth are of average size, finely rounded ; good and shapely edges and cusps ; brilliant rich cream color, inclined to bluish shades.

The Nervo-lymphatic.—The teeth are above average size and length ; of good shape ; the color bluish-gray and texture chalky. The arch is round.

The Bilio-nervous.—The teeth are as variable in size, form, and all other characters as can well be imagined ; in some they are broad and shapely, in others long and narrow. The necks are often narrow. The color is blue or yellow, but dark. The cusps are usually long. The arch presents curious combinations of the square and V-shape, with varying abnormalities of form and disposition to irregularity of the teeth.

The Bilio-sanguine.—The teeth are of average size, finely shaped, with well-developed and shapely cusps and edges ; rich, dark cream color or bright yellow. The arch is of good form, the round-square.

The Bilio-lymphatic.—The teeth are of large size with thick edges, short thick cusps ; the color yellowish ; the enamel bright or opaque. The arch is round and the articulation flat.

The Lymphatico-sanguine.—The teeth are of more than average size, with shapely edges and cusps ; color grayish-cream, inclined to muddiness. The arch is round and the articulation flat.

The Lymphatico-bilious.—The teeth are of average size ; good shape ; heavy, well-developed cusps and edges ; of a rich dark cream color, inclined to orange. The arch is round-square ; the articulation close and firm.

The Lymphatico-nervous.—The teeth average less than the usual size ; are of shapely form with long cusps and edges ; color grayish-blue, inclined to opaque-white. The arch is a round V-shape ; the articulation deep. In general, the characteristics are very irregular.

These descriptions are only general, and variations from them will be found to be very extensive, but a study of the temperamental variations of the teeth is very important to the dentist if he would assume the rôle of artist in his work. As Dr. J. W. White said years ago (Dental Cosmos, vol. xxvi, p. 114), the value of a practical application of the study of temperament in the practice of dentistry is apparent. A certain law of harmony in nature between the teeth and the other characteristics necessitates respect to the size, color, and other qualities in correspondence with the indications of temperament. The teeth should be correlated in their characteristics to those which nature assigns to the temperament of the individual, that dental service may be well performed from an esthetic and artistic as well as from a mechanical and therapeutical standpoint.

DETACHABLE PORCELAINS FOR CROWN- AND BRIDGE-WORK.

BY W. L. MASON, D.D.S., RED BANK, N. J.

(Read before the Academy of Stomatology, April 28, 1896.)

Mr. President and Gentlemen: I present to you to-night for your consideration a system of detachable facings for crown- and bridge-work,—a system that does not in any way change the appearance of the perfectly made crown or bridge of to-day.

About sixteen years ago, porcelain facings, soldered to gold bands, were put in general use, and closely after came the bridge-work,—very crude at that time, but advancing rapidly to the almost perfect construction of to-day. I could say perfect but for one fault, and that is the uncertainty of the condition of the porcelains after soldering and cementing into position. I know that we have teeth to-day that stand the strain better in the process of forming them into crowns or into bridges, but they will never be made to expand and contract like metal. We may be very careful in heating an invested piece for soldering, and cool off properly, and try the piece in, and have no strain upon it, so we cement in position. As nearly as we can see, we have a perfect piece of bridge-work. But, just as long as the piece is in service, the porcelains are apt to separate from their backings. I think it is a great necessity that we attend to the future conditions which are apt to happen with a porcelain on crown or bridge. We are apt to have a patient return with a porcelain broken off, and we should so construct our work, if possible, as to repair the damage quickly, and not only for the patient's comfort, but also our own.

I will acknowledge that I have never yet repaired a bridge in the mouth to my own satisfaction where the porcelain is soldered to its backing. Is it practical to have a porcelain detachable? It must be, for scores have tried to produce them. Patent records show the efforts made. Up to date none have been invented so that they can be manufactured and sold to the dentist for his immediate use, and, whether they are practical or not, I leave for you to examine the mode of forming and to judge for yourselves.

In my judgment, a detachable porcelain is just as important to crown- and bridge-work as crown- and bridge-work is to dentistry.

For a number of years I have been seeking a mode of constructing the porcelains so that they would separate but have a perfect contact with the backings, and be equal to the facings now in use. Through that effort I have produced a system of dovetails and grooves to match, and a process of manufacturing whereby a porcelain is made independent of its backing, so that a porcelain from one mold will fit each and every one of the backings made for that size mold, making them universal in their use.

I will call your attention to a few illustrations of the process.

Fig. 1 shows a lower cuspid crowned and cemented to its root. Fig. 2 shows its porcelain sliding from its backing. Fig. 3 shows porcelain and backing separate. This illustrates the mode of constructing the six anterior upper and lower teeth. In Fig. 3 we have a metal dovetail fitted perfectly to the back of the porcelain, and extending a little beyond its cutting-point. It also shows its solid backing with a groove to receive the dovetail. It will not be necessary to go into the details of the construction of the parts, but only that part of the work that is left for you to finish, as the porcelains with the metal dovetail attached and the grooved backing are manufactured. The tooth with its backing is fitted to the band by grinding out where necessary. Then wax the gold backing to the band, and after the wax is hard, take hold of the extended portion of the dovetail and draw it from the backing. The crown is now ready to invest. Be careful to fill up the dovetail groove, and let the investment material come over the cutting-point of the backing, so as to keep out of it all solder.

FIG. 1.

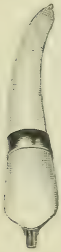


FIG. 2.

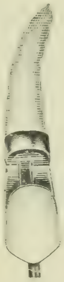


FIG. 3.

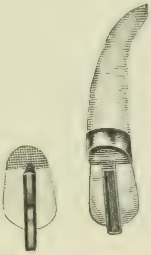


FIG. 4.

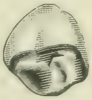
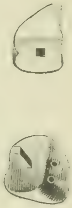


FIG. 5.



Heat up, solder, and cool as quickly as you like. After removing from the investment, see that the groove is thoroughly cleaned and dried ; also the dovetail on the porcelain. Now take some chloropercha, quite thick, fill up the groove, and force the porcelain into position. Saw off (don't cut) the extended portion of the metal dovetail. Then finish as usual. For use as a dummy, articulate to position and join the parts with wax. The condition for the posterior teeth I have changed somewhat. Fig. 4 shows a molar dummy, with its cusp and porcelain together, having the same general appearance of the molar dummy in general use, with the exception that the porcelain takes up more space on its palatal portion, making a saving of gold.

Fig. 5 shows the dummy parted, giving a view of the joining parts of a solid gold cusp, the upper buccal portion sloping upward and backward toward the ridge, and having on its face a square pin extending forward and upward. Fig. 5 also shows a porcelain with a square hole extending from the surface just above the cusp portion, upward and outward to receive the square pin fitted to the cusp. After placing the cusp and porcelain together, the dummy is ready to grind into position. Wax the parts together, remove the porcelain, and solder. Afterward cement the porcelain to the pin and finish as usual. The advantages gained by this method are many, and can only be appreciated by the practice of it.

The first advantage, you do not have to place your teeth under the flame of blow-pipe.

Second. You have a solid backing without bubbles, as all parts are drop forged.

Third. You can heat up your invested piece quickly, and not have to take the usual care ; you can also cool off quickly.

Fourth. The small amount of solder used,—just enough to join the parts together.

Fifth. Saving your porcelain from being etched by borax.

Sixth. You are able to fit a bridge, releasing the strain by cutting and resoldering, and not have the porcelain interfered with.

Seventh—the most important of all. The amount of time saved to the busy dentist will equal about half of the time spent in the old method, and being free from annoyance in spending part or whole of a day repairing a bridge ; with this system the repair is but a matter of a few minutes. If you put a tooth of mold No. 22 on and it should break, you may order an exact duplicate and slip it in position, keeping yourself in a good humor, and giving your patient the greatest amount of satisfaction.

THE FATE OF ASSOCIATIONS.

BY J. C. WALTON, D.D.S., HOWELL, MICH.

(Read before the Michigan State Dental Association, June 10, 11, 12, 1896.)

Associations of individuals for mutual help and encouragement existed in ancient Egypt, flourished in Greece and Rome, and exerted an influence in all European countries during the middle ages. There were Danish, German, and Belgian guild laws, which provided that no one should become a member who had "dirty hands," or "blue nails," or "who hawked his wares on the street." Concord and ethics were assured by stringent regulations, and no member was allowed to entice away a guild brother's customers. But principles of exclusiveness were introduced and exerted tyrannic sway. Privileged cliques grew oppressive. Petty rivalries and hateful egotisms took the place of the great idea of association until they lost their original characteristics and became merely social and benevolent clubs.

Topics of a medical nature were first discussed in the Royal Society of England in the seventeenth century, and medical societies, as we know them, were first formed in the early part of the present century.

Ambitious dentists formed the Society of Dental Surgeons in 1841, the object being to stimulate and encourage investigation, contribute to the society knowledge gained by study or experience, to increase the knowledge and improve the practice of each, and benefit humanity at large. At this time dentistry was in a chaotic condition, with neither literature, colleges, nor societies. Those considered eligible numbered about one hundred in the United States and Canada, and at the first meeting only thirteen were present. For several years the proceedings were instructive, harmonious, and dignified, indicative of close study and careful observation, and conducive to a spirit of energy and liberality. Then quibblers and politicians ruled its management, and it passed out of existence in 1856.

The American Dental Convention was organized in 1855. Communistic ideas prevailed, and an attempt was made to "level up" the profession by admitting the rank and file to an equal share in association benefits. But many exclusive though able spirits refusing to participate or be present on equal footing with mediocrity, the association waned in vigor from year to year, and passed out of existence in 1880.

The American Dental Association was organized in 1859. The delegate system adopted appears to have been a happy plan for encouraging general association work, for state and local societies have rapidly multiplied until to-day we have over one hundred. It has never, however, been accepted fully as the national organization its founders aimed to make it, and of late evidences of enfeeblement are apparent and confidence in its future influence begins to decline.

The apathy of societies in general is being remarked. The failure to reach the profession as a whole and through them win from the world a better appreciation of our art is being mourned. We believe that successful results for general welfare can be secured only by general effort, but melancholy has been the failure to unify and associate for general good. Twenty thousand dentists in the United States have no interest in associations. Perhaps five thousand have. Those only who aspire to social rank in the profession bother themselves about societies.

The laws of human impulse are the same to-day as in guild craft days.

We are drifting from some of the acceptable objects of organization. We may be "cultivating the science and art of dentistry," but we are not trying very hard "to promote mutual improvement, social intercourse, and good feeling" among dentists in general. Society goers, as a rule, are trying "to elevate and sustain the professional character" of society members, but nearly nine-tenths show their appreciation of our efforts to "represent and have cognizance of the common interests of the profession" by non-support and non-attendance. Are not principles of exclusiveness gaining ground? Are not cliques monopolizing the honors? Are not petty rivalries and hateful egotisms taking the place of the original ideas of association? Does not the history of associated effort show that when "the greatest good to the greatest number" is the ruling sentiment associations flourish, and that they wane when the masses are forgotten?

We are constantly blaming those outside our societies for the attitude in which we find them, when there are reasons that show they are less blameworthy than we. Half our dentists do not understand the object and advantages of association. A strange confusion prevails in regard to the duties of the State Board of Dental Examiners, the aim of the state society, the provisions of the dental law, and the responsibility for its enforcement. With nearly fifty colleges, twenty journals, and a hundred societies, it is hard to explain the misunderstanding and misinformation existing.

Cities dominate in society control, but do not breed liberal and broad-minded men who are capable of seeing the profession as a whole. Cities produce specialists, and specialists favor what will tend to promote the success of their specialty. The mass of suburban and rural dentists do not and cannot practice as specialists. Accepted association etiquette is too often a brand of professional piety that blushes at communion with rustic manners and shop talk. Mediocrity is rarely forgiven and provided for. The country dentist expects and is expected to submit to the specialty interests and club fashionableness of urban management. The average dentist is in a position to feel that fellowship cannot be accorded him until he changes, and, if he changes, his untutored patients will have little use for him. Therefore, he stays away, living on in solitude, with dwindling interest in professional advancement, too often nursing the belief that professional life, if typified by the vanguard, is but a school of hypocrisy, where a few expend their genius in counterfeiting medicine and many try to conceal under borrowed dignity the tooth-carpenter, tooth-jeweler, and maker of store teeth. The temper of the profession at large is little understood and not studied. We are woefully divided by ethical and other antipathies, and strained relations exist between the society goer and the non-attendant. Differing dentists are constrained to adopt different means of attracting public attention, suited to the mental, social, and financial condition of the clientele desired. Most of us follow it as a vocation, with general net results the incentive. Half, perhaps, are influenced to a greater or less degree by the code of ethics, and half are indifferent, while a small per cent. hoist the black flag of dental piracy.

There should be a method higher in popular efficiency than that which qualifies each invitation to its membership by adding, "if you are a reputable dentist,"—that is, forever seeking to establish a line of demarcation between its own perfection and the ethical infidelity of "the other fellow." There is wisdom in insisting by one's manner that every one who takes your chair is chaste, moral, honest, and intelligent enough to appreciate your effort. Just so in society management. It will prove profitable to give every practitioner credit for being moral, honest, and intelligent enough to belong to the State Dental Association until proved unworthy. If the candidate is legally qualified to practice and promises to be governed by the rules of the society, it is enough.

The individual who desires friends must prove himself a friend. It is so with societies. They must be managed to compensate those whom we wish to attract. To gather in and supply incentive, instruction, and entertainment to the dentists of the state is the practical problem for state societies. This society is not the place to encourage a few to believe in their professional virtue. It should supplement the college, the journal, and stimulate home study. It should be the special agency for the supervision, extension, and development of the profession as a whole. To secure excellent legislation and prevent vicious legislation, to help remove apprehensions and correct false ideas, to gather into reports the nebulous information existing among the practical men of our time, to assert the features of an educational force controlled by wise men, is a possible result.

All want to know how to diminish failures, to promote co-operation, to facilitate transmission of ideas to our clientele, to secure proper status, to guard against financial loss ; such would be general progress.

We may have the benefit of contest between man and man,—which is always a powerful attraction,—but it should only be a contest in research, experiment, and teaching. It is right to compete with and combat quackery, but wrong to ignore and shun the quack. The way to obliterate darkness is to let in the light. The way to correct newspaper deception is to supply newspaper education. Quackery should be regarded as misdirected energy, and a thoughtful effort made to get control of it. If we are not willing to tolerate it, to listen to it, to find out the truth that may be in it, to supplement it, to enlighten it, we belong back in the witch-burning period of history. We may be sure there is some reason for its existence. Why ignore a reason wherever found? The savage remains the savage, the thoughts of the savage continually being within him. Place him in the midst of civilization, give him new thoughts, new hopes, new aspirations, new impulses, and you raise him above the savage state. This is the whole history of civilization, of enlightenment. Three-fourths of us thus need to be placed in the midst of professional civilization ; we need to be given new thoughts, new hopes, new aspirations, new impulses, and raised above ourselves. Ignorance and enmity are convertible terms. Rancor and retaliation are likely to make trouble until transformed by concession and education. Increased knowledge has never brought aught but blessings to the world. Membership in the society would strengthen any dentist's attachment to his profession. In every state are needed one or more societies that are founded on those broad principles which find their counterpart in the heart of every dentist : a society instituted and managed for no personal or selfish gain ; a great school of comparative dentistry, to bring different methods and men in contact and conference ; to encourage and deepen the spirit of brotherhood ; to emphasize the distinctive achievements of the art ; to bridge the chasm of ethical separation between the liberal and the exclusive elements, and induce dentists to pull together for our common improvement.

There is little use of cultivating sentiment against the dentist of the masses, refusing to educate the masses, and then expecting him to fraternize on present society terms. It is the business of societies to teach and demonstrate the beauties of an ethical life, the profit of correct practice, and the nobility of our calling. If a college education and society affiliations do not develop courtesy for the opinions of others, toleration, a spirit of helpfulness, and an earnest desire to do one's best, they fail of a high mission.

Electricity sleeps in mere potentiality, as a force hid in the coal bin, until, through heat and motion, under proper control, it appears to work its wonders in your office; so, the genius of human power lies dormant until shocked into efficiency by a wave of suggestion or a flash of illumination. At a dental meeting a single word, the turn of a phrase, a demonstration, may be potent to stir into activity a native dormant power. Who would deny any member of our profession the inspiration? Every dentist should experience the thrill of such an inspiration. Who of you have attended a meeting without having had the deepest wells of your thought strangely moved to action, and, going home with energy awakened in every fiber, have not felt irresistibly the impulse to do better? Yes, the present age of enlightenment demands this reciprocal action, this interchange of intellectual currents between dentist and dentist. Wisdom so inspired has given to the world all that is worthy in art, science, letters, and all else that is imperishable in civilization.

Perhaps most of us think we comprehend the object of association and the results are satisfactory. If we are right, then no change would be salutary. If the theory is correct that to level men we must level downward, and that a society should be a professional despotism in which the wisest and ablest are supported by an admiring and sympathetic following, then it is trespassing on forbearance to present this theme.

But, for me, the spirit of a society's action should be altruistic. The terms of admission should be really inviting, not nominally so. The welcome should be generous, not repelling. The rank and file would thus be encouraged and stimulated to self-improvement. Clubs and coteries would still adopt methods to protect their exclusiveness. With them, social qualifications may rightly continue to influence the choice of membership. In a popular body this cannot be, and a state society should be a popular body.

◆

PROCEEDINGS OF SOCIETIES.

THE INTERSTATE DENTAL MEETING AT EXCELSIOR SPRINGS, MO.

THE Interstate Dental Association, comprising the State Societies of Nebraska, Iowa, Missouri, and Kansas, held a meeting at Excelsior Springs, Mo., June 23, 24, 25, and 26, 1896.

The first session was opened Tuesday, June 23, at 2 P.M. President Dr. J. P. Root, of the Kansas State Dental Association, opened the first session. The address of welcome was given by Rev. Luce, of Moberly, Mo., which was replied to by Dr. J. T. Abbott, of Manchester, Ia.

Under miscellaneous business, the matter of making this interstate organization permanent was brought up by the president. A paper on general district organizations for the entire United States was read by Dr. A. H. Thompson, of Topeka, Kan.*

After some discussion, a committee consisting of one representative from each of the four states was appointed to consider the matter of making this organization permanent, and to take the paper under advisement and report at the close of this meeting.

---

* This paper was printed in full in the DENTAL COSMOS for July, p. 562.

Dr. C. J. TIBBETTS, of Quincy, Ill., read a paper upon "Orthodontia," of which the following is an abstract:

We have been compelled, in following the advances of the times, to divide dentistry into specialties, thereby raising the effectiveness of each branch and rendering the greatest good to the greatest number. The contraction of the dental arch deforms all the surrounding parts. The hard and soft palates are distorted; the nasal passages are contracted; the septum deflected; the turbinated bones deformed, etc., so that imperfect breathing is performed. Septic conditions arise in the nasal cavities on account of deformity; local treatment for catarrh is employed, and the mucous surfaces are permanently injured and their functions arrested. Early correction of the defective arch would obviate much of this abnormality. Natural beauty of the features is restored, defective vocalization is corrected, and other benefits bestowed; but such services require the skill of trained specialists to accomplish the best results.

Dr. H. J. McKELLOPS, of St. Louis, had found great improvement and advancement in the treating of irregularity of the teeth in the course of years of observation. The ingenious appliances and marvelous skill of the expert specialists we have nowadays, seem to do their work almost by magic. It is wonderful. The essayist is wrong in saying that these things in the way of correcting irregularities have been neglected. They have not. They have been studied for years, and progress has given rise to specialists who give their whole time and skill to it. The profession should be proud of what these specialists have accomplished.

Dr. E. BUMGARDNER, of Lawrence, Kan., read a paper on "Heredity and Pre-natal Culture," of which the following is an abstract:

Heredity is the law by virtue of which living beings tend to transmit their own characteristics to their descendants. Upon it depends the preservation of species, and the more detailed resemblance which is recognized in a family type. Peculiarities of anatomical form and structure are frequently transmitted through many generations, but they finally return to the form longest established. The many influences which tend to deflect inherited tendencies from their original direction make it difficult to construct a formula which will express the value of heredity in a given case.

Affinity between the natures of the parents may produce a new character in the child as a chemical compound is formed by the union of different elements. The law "like begets like" is absolutely true in the simplest forms of life, illustrated by the amœba. Sexual reproduction implies a difference in the organization of the parents. Some characters, as sex, cannot be transmitted by both parents. Most characters, however, are derived from both parents. The child inherits characters which are not manifested in the immediate parents. Each individual possesses latent characteristics which may be transmitted in this condition for many generations, but which are manifested whenever the determining forces are concentrated in the proper direction. The exercise of a dormant or acquired character increases the probability of transmission and of active manifestation.

There are many erroneous conceptions of what constitutes an acquired character. A mutilation is not acquired, but is impressed upon the body from without. The loss of a part by accident does not produce an internal modification of the organism because it does not affect the vital force. Heredity cannot predetermine exactly what any individual shall be. This gives opportunity for pre-natal culture. The good conferred by heredity may be developed and transmitted to future generations, while the useless is allowed to atrophy for want of exercise. The development of the child depends upon the life of the mother during gestation. Her mental condition even affects its physical development. Such deformities as harelip have long been accounted for in the public belief when the pregnant mother had received a mental shock from the sight of a similar deformity. Observation has accumulated such a multitude of cases that the potency of such causes is now recognized by medical men.

Pathological conditions make the working of the law of heredity still more complicated. It is difficult to separate pathology from physiology. To a certain extent health and disease are relative terms. Disease consists in an unusual relation between waste and repair, which produces conditions interfering with functional activity. Few diseases are transmitted directly. Usually both predisposing and exciting causes are responsible. It is the *condition* of body or of tissue that is transmitted. In this sense, most dental diseases are hereditary; they are invited by inherited weaknesses which render the body more susceptible.

Heredity must be considered in order to understand perfectly the etiology of pyorrhea, dental caries, and other dental diseases. The inherited defect or disease does not always assume the same form. In some cases we can look forward to a transformed type of the disease. The Hutchinson teeth represent a syphilitic condition different from that in the preceding generation. Heredity is responsible for most dental irregularities. These occur in the pure races, but not so frequently as in the mixed races. An irregularity may be the result of an incongruous temperament which has been produced by interracial marriage.

It is difficult to permanently correct an irregularity which exists as a family type. The persistence of the type will be in proportion to the number of generations since it was established. The dentist, as well as the physician, has a duty to perform, not only in making use of a knowledge of heredity and pre-natal influences in his practice, but in making these subjects known to the public. He often has a peculiar though a delicate responsibility to consider in the condition of patients who consult him while *enceinte*. He should understand and promulgate the laws which will make the ideal of to-day the possession of to-morrow. The human face will never reach its highest perfection in beauty and refinement unless pre-natal influences be employed in the development of that perfection. No one can pioneer this work better than the dentist, who is permitted to study the face from the standpoint of an artist whose duty it is to restore defective parts in the most perfect manner possible.

Dr. J. D. PATTERSON, Kansas City, Mo., said it was quite impossible to discuss this subject without study and preparation. But he would say that while pre-natal influences are indeed very great, experiments in controlling the quality of offspring had been tried since classic times, and the result had been nil. Temperament had much to do with it. Mental impressions on the mother might have some effect on the undeveloped tissues, but after formation could have no effect. Fright could not affect any one part, but would have its effect, if any, on all parts in process of formation. The popular notion in regard to the effect of fright of the mother on the forming fetus was an illusion, and very few of the reported cases were authentic. Defects as of cleft palate occur in families with a healthy history. It is not often hereditary. The dentist can do little in instructing people in controlling pre-natal influences.

Dr. A. H. THOMPSON, Topeka, Kan., desired first to congratulate the essayist, as a young man, upon the production of the paper, and hoped it would be a stimulating example to other young men to devote themselves to study and research.

The question of heredity is a very difficult and fascinating study, and the essayist has brought out many of the laws involved in an excellent manner. Regarding mutilations, it has been conclusively demonstrated that they are not transmissible. Many examples in man and animals attest this effect. Alterations in structure are brought about only in response to demand for useful variations,—not otherwise. The theories of the essayist are excellent, but the application he makes of them regarding the dental region is out of the range of possibility. We as dentists can do little or nothing in advising our patients regarding pre-natal culture. It is too delicate a subject, and nothing could be accomplished if our advice was followed.

Dr. BARTON, Texas, said that mutilations could be transmitted, as when the whole of an organ, as a whole tooth, was removed. Thus the reckless extraction of teeth would have its effect in transmitting defective jaws to successive generations. When part of an organ only was removed it had no effect, but it required the removal of the whole of an organ to insure the transmission of the defect.

Dr. LOWRY, Kansas City, Mo., said that consanguinity never produced physical defects, but only mental deficiency. The physical perfection was rather improved by crossing of the same blood, but the mental force was reduced.

After other discussion Dr. BUMGARDNER said, in reply to the last speaker, first, that apparent physical improvement from consanguineous crossing was only temporary and during the first generation, but in the next there would likely be physical degradation as well as mental. It is impossible to foretell what phase of weakness or disease will be assumed by heredity. Almost no diseases are transmitted, but only the predisposition to disease, and the form of the predisposition may be different from that of the parent. In regard to inherited mutilations, Professor Osborn says they are not transmitted because not acquired ; when really acquired they are liable to be transmitted. In mutilation there is no change in the growth force and reproductive tendency. In regard to the effects of fright on the mother, he had facts and could cite cases from records and from observation to prove that cleft palate had been caused by fright. Virchow recorded ten cases in which impressions made on the mother during pregnancy had produced effects on the fetus.

Adjourned.

At 8 P.M., Dr. EDWARD H. ANGLE, of St. Louis, Mo., gave a lecture upon "Orthodontia," with many beautiful lantern slides illustrating cases, appliances, and methods of treatment. The subject was ably presented and beautifully illustrated.

The morning of Wednesday, June 24, was devoted to clinics.

At 2 P.M. the meeting was called to order by Dr. Heustis, vice-president of the Nebraska State Dental Society.

After miscellaneous business, a paper was read by Dr. E. I. WOODBURY, of Council Bluffs, Iowa, upon "Making Metal Dies Direct from Impression." The nearer we come to the mouth, the better will be the result. In the old process of sand molding there were several transfers, and each step involved changes and defects. In this process there are but two transfers,—first, the impression, and, second, the pouring and pressing down of the molten metal. In the new process the metal is poured in a semi-plastic condition, and tamped in the mold to avoid the spheroiding involved in the old procedure, when the metal had to be poured very hot. The material for the impression is fine clay, or a clay compound, with an equal part of plaster, which is the *aluminous compound* he uses. It will not shrink nor expand. It is also a good investment for soldering. He uses a perforated tray, made in parts, composed of an alloy of two per cent. of copper with aluminum. This will stand the heat of the temperature at which the metal is poured. It is perforated for drying and permitting the escape of steam. Any die metal may be used, but he prefers Pastel's Babbitt metal and lead and tin for the counter-die. The flasks are made in three parts. The impression is held in the lower part, filling in around it with the investment compound. The middle part of the flask is made to hold the metal. The impression is trimmed to relieve pressure in the proper places, for the metal model cannot be trimmed afterward. After drying and heating the investment portion, the Babbitt metal is melted to mere fluidity, then stirred to make it plastic, poured into the impression, and tamped down well to make it fill all portions well and prevent spheroiding. It is cooled in water; dry it well, and smoke to prevent adhesion, and pour the counter-die metal. There are four special advantages in the process: (1) the short time required to make the die; (2) the low temperature at which the metal can be poured; (3) all irregularities can be sharply taken; and (4) the ease of the process, by which even a novice can get good results at once.

Dr. HUNT. It is curious that prosthetic dentistry receives so little discussion in dental meetings as compared with operative dentistry. There are many expert operators, but few expert prosthetists. But we are about entering on an era similar to that of thirty or more years ago,—a period of metal, when gold will be used more and more. We are coming back to the gold methods of three or four decades ago, in order to get the best results in practice. Forty years ago Dr. Clark described a method similar to this for obtaining dies direct from the impression; but this is much superior to his. The ordinary methods of obtaining dies are very defective. It is a great advantage to have something like this method to use which will give better results.

Dr. F. M. SHRIVER, Glenwood, Iowa, had been using Dr. Woodbury's process. You have to be very careful to avoid bubbling. First dry the impression, then place it in the ladle on the molten metal to get it to the same temperature before pouring.

Dr. ———. Stirring the molten Babbitt metal will defer crystallizing for a long time, so that it can be poured at a low temperature and prevent bubbling.

Dr. R. MATHEWS, Wichita, Kan., had made a low fusible metal which melts below the boiling point of water and is very hard. It is composed of forty-eight parts of bismuth, thirteen of cadmium, and nineteen of tin. It melts at so low a temperature that it can be packed with the fingers. A common plaster impression can be taken to the laboratory and poured at once without waiting to dry,—can even be poured in water. For counter-dies he had used common modeling compound. He softens and places it in a ladle, and places the die on it and drives it in with a plunger and hammer; then places the plate on the model and swedges in the counter-die after it gets hard. Do this three or four times. But this will not draw it close enough; so he will now use shot in the later part of the process, as has been suggested.

Dr. WOODBURY. The making of dies from low fusible metal is an old affair. Dr. Franklin, of New York, years ago used such a method, just a trifle different from the process of Dr. Mathews. He cast a die of plastic metal, and then covered it with sheet lead. This was removed, and lead poured around it to make the counter-die. The shot method cannot work. It will squash around and between the plate and the die. A list of the formulas for low fusible metals can be found in Richardson's "Mechanical Dentistry."

Dr. W. A. COSTON, Fort Scott, Kan. The shot method is old, and was first suggested by Dr. Parker, of Grand Rapids, Mich. After making a die after Dr. Mathews's method and drawing the plate upon the model, he wraps the plate and die in a cloth to prevent the shot from getting between them; then places it in a strong cylinder containing the shot, and with a close-fitting piston drives it down. He uses the method extensively for aluminum plates. After using five or six times the shot became battered; but chilled shot last better. He had thought of small steel balls like shot; but they are too expensive to make.

Dr. F. SLATER, of Rich Hill, Mo., read a paper on the "Care of Children's Teeth." Abstract: The temporary teeth should be preserved until their permanent successors are ready to take their places. Does not do much at the first sitting, but tries only to get their confidence. All work for children is of a temporary nature. He finds oxyphosphates the best filling-material for children's teeth, and it can be renewed when it wastes out. He does not destroy the pulp, but leaves nature take her course. When necessary to do so, he treats the same as the permanent teeth. The man who does not try to treat children's teeth does not know of the friends he has lost.

Dr. EMMA EAMES CHASE, of St. Louis. The ideas advanced by the writer are in the line of her own practice. The child who has been well taken care of by the dentist is a better patient for him in later years than one who has not. Children who are frightened can be won over by proper treatment and patience.

It is an important question as to how much the quality of children's teeth is affected by the food employed; but this cannot be settled without extensive observation and statistics. In the mean time we must do all we can by cauterizing with nitrate of silver, filling and crowning to preserve them as long as necessary.

Dr. A. H. Thompson. The last speaker referred to crowning or capping of children's temporary teeth, which the present speaker considered of great importance as a means of preserving the teeth during the few years they were required. He had performed the operation with success and benefit, and would like to learn from others present as to what they had done in the same way.

Dr. —— had used nitrate of silver on the white line of caries which occurs near the gum on deciduous teeth, and stopped the trouble entirely. In one case he found that the diet of the child was entirely of milk, and, after some conflict with the physician, got the parents to allow more solid food, with marked benefit.

Dr. Tibbetts thought the treatment of children's teeth a most important matter, and especially as related to the great subject of orthodontia. Without the retention of the temporary teeth the jaw cannot properly develop. The teeth should be filled or crowned,—platinum is the best for this,—and when they cannot be even capped, the angles should be ground down and the roots left in to preserve the contour of the jaws. If the roots are lost, it will allow of maldevelopment. If one of the incisors is lost some months too soon, there will be contraction of the jaw and filling of the space. He had seen cases in which the loss of one incisor had caused the cuspids to draw in on account of the pressure of the tissues of the face. These teeth drew in the lower cuspids also, or closed within them. Mouth-breathing had much to do with contraction also. Just as soon as their condition is recognized, the upper cuspid can be held apart and spread by drilling small pits on the inside and putting in a German silver wire, pinching it to spread the teeth apart gradually. The general practitioner should give attention to the fundamental principles of orthodontia, even though he does not practice it. He may be able to prevent much irregularity. Our greatest difficulty is usually with the parent rather than with the child. We must have our way with them even to the extent of being arbitrary in the matter. He does not allow the parent or guardian at the chair when he is operating on the child, after he has explained to them what he intends to do. He excludes them, and thereby gets the child to look to him for sympathy and encouragement. He gets their confidence and then is careful to not hurt them, and the battle is won. Children should not be hurt at all at the first, and later on will endure all you should ask of them.

Dr. McKellops. The first thing is to get the child. Teach the parent what the child needs, then make love to the child and get its confidence, and the rest is easy. The parent must be shown how to care for the teeth of the child. Oxyphosphate will preserve the teeth till they are lost. At that age they do not need to be crowned; renewing the filling will do just as well, and save the suffering of crowning. Irregularities do not occur as often from the extraction of the deciduous teeth as Dr. Tibbetts would have us believe. Do not be rough with the child, and you can lead them on until they will bear even gold filling. How would you exclude the parents from the chair, and yet teach them the care of the child's teeth? The mother must stand at the chair, that you may show her what is being done.

Dr. SLATER agrees with Dr. McKellops that crowning is of no use for children's teeth, for filling will preserve them just as long. Had not used nitrate of silver, and did not see the need of it. He had noticed that city children had more diseases of the deciduous teeth than country children. Premature extraction is a misfortune to the child, but he is not quite convinced of its responsibility for the contraction of the arch. He knew of cases where the incisors had been prematurely lost, and the space had widened all the time to the eruption of the permanent incisors. Care must be taken in the extraction of the temporary molars, for fear of disturbing the germs of the permanent bicuspids. He had seen cases in which this had been done.

Dr. A. O. HUNT, Iowa City, Iowa, read a paper upon "Dental Education." He said that it was much the fashion among a certain class of men, who never take the trouble to learn anything about them, to criticise and condemn the colleges unjustly. At the last meeting of the American Dental Association this criticism was carried to an outrageous extreme. If these critics would take the trouble to visit the colleges,—the best colleges,—and inquire into their workings, and see the conscientious, self-sacrificing labors of the members of the faculties to give the best education possible to the young men under them, they surely would not be so unjust. It is a fact that the best men in the profession to-day, the men who lead in professional work and who labor for all things that tend to advancement, are in the colleges. They lead in everything, and they do not get rich as has been charged against them by those same critics. It is usually a source of loss to them instead of profit.

Dr. ABBOTT. The paper is full of interest. There has been too much criticism of the colleges, and yet this criticism has tended to the upbuilding of the schools. The paper is peculiarly appropriate at the present time, as there has been so much unjust criticism, for in reality they have been branching out and improving. It has been said that "mediocre education gets the work" in most callings and professions, but if that is a fact, it should not deter the schools from advancing and correcting these false ideas. The people should know better. An educator, a man of extensive observation, has said that "the world at large has no appreciation of true worth." The same might be said of the true educator,—whether in the colleges or out of them,—for many true educators have no connection with institutions of learning. We have been advancing rapidly of late years.

Organization has been the watchword from the time of the Olympic Games, and is so to-day. We now allow women to share in the advancement. I care not what position a woman may occupy if she is honorable and prepares for it. She will get there at any rate.

Those who go out from our colleges will exert an influence on the people. The educated man will occupy the position he should. All things have a crude beginning. No things are perfect at the start. Just so it is with our education. I knew well old Professor Chapin A. Harris when he started the Baltimore College. It was a crude beginning. They gave us the best ideas of the best minds of that day. So it is with our schools down to our day. They have all along given us the best things of the world as the times have progressed, and the colleges of to-day are giving us the best things of the world. I remember the day when we took a silver dollar and a piece of block tin and filed them down at the bench, and mixed the filings with mercury, and filled teeth with the alloy so made, and it did good service. It was the best thing of its kind in its day. But now amalgam is better made by better processes. The old methods would not do now.

Matriculates of a college should have a good general education. As to whether the student should first be in an office or not depends on the office. It so often happens that office education needs to be undone by the colleges, and such a student would be better off to go to lectures without any office experience. But a proper office training is a good preliminary to college education. Members of the profession should visit the colleges more and see what is being done and how it is done, and there would be less ignorant and unjust criticism. Few of the critics ever visit the colleges, and they are the men who are kicking about the colleges,—not those who have tried to gain information regarding the working of the colleges.

Dr. Patterson. We would like to hear the other side of this story. A majority of dentists criticise the schools, and we have long tried to find out the cause and reason for the wholesale condemnation. We now want the other side, or for them to be outspoken.

Dr. O. M. Huestis. The colleges are turning out too many young men, so many more than they did years ago. Are these graduates any better than those of former years? They make too many quacks. Too many graduates are not properly educated. He would like to know how that is.

Dr. Hunt. That is the simplest question in the world to answer. College professors are not quacks. Not one of those before me to-day, or any other one in any other college, ever teaches quackery. The students never learn of "Dental Parlor" methods in the college. The speaker never allows the smallest chance to pass by, never misses the smallest opening, without getting in something about quackery, and preaching against it. He knows every other college professor does the same. Where then does the student get the idea of quackery? They have not got the mental education and moral stability to stand up, and, by example and precept, defend their professional honor. No college ever taught a student quack methods as practical; he is always urged to let quack anesthetics alone; to avoid even the appearance of evil, and to follow honorable principles.

Dr. Austin. The colleges are not careful enough in admitting candidates. They count the fee too readily, and admit men they ought not to do to get it.

Dr. Patterson. The men who take to quackery are often of the first class, and in haste to make money. But be it known that there are not more than four per cent. of the students who go to colleges who do not come from you regular dentists. The vast majority of them are sent by the members of the profession, and they do not select the men. The fault is primarily with the profession. They come for *you* and *you*, and *you* do not discriminate as to their moral character. *We* do not want them. We cannot judge of their fitness morally. *You* must do that. Yours is the fault, not ours.

Dr. J. F. BURKETT, Kingman, Kan. I agree with Dr. Patterson that we, the profession, are largely responsible, and yet the colleges get the most blame. A great deal depends upon the atmosphere of the office from which the student goes. We must send up better material.

Dr. ———. I think that the charge of quackery should not be laid at the door of the colleges. Most of them do not turn out quacks ; but some do. These are not to be considered, however, as they are simply quack colleges.

Dr. ABBOTT. If you have native cussedness in an individual, it will take physical chastisement and moral discipline to overcome it. The quack is usually a quack owing to incompetence and cussedness.

8 P.M. After the opening, Dr. H. F. KING, of Fremont, Neb., reported some investigations he had been conducting in regard to root-filling. He sent out two hundred teeth imbedded in plaster to various dentists, with the request that they fill them in their usual manner, and return them to him to be opened and examined and the results tabulated. The teeth were to be known by numbers, the names of operators to remain a secret. When the returned teeth had been examined, they were found to have been filled with chloro-percha, gutta-percha, oxychlorid, lead, tin, or copper points, shellac, wax, etc. One-eighth of an inch of each root was first sawed off, and if the apex was found well filled, it was placed in class 1 ; if through the apex, in class 2 ; if it did not reach the apex, in class 3 ; if drilled through and otherwise protruding material, in class 4. Out of one hundred and twenty-three teeth returned, forty-seven per cent. were well filled. In fifty-three per cent. the operator failed to reach the end of the root. The majority of the cases were of normal form, and some of the failures were due to accident. The most difficult cases were sometimes well filled.

Dr. W. H. DE FORD, of Cedar Rapids, Iowa, read a paper on "Söderberg's Method of Preserving Devitalized Tooth-Pulps." It has been proven by the investigation of Dr. King that only about fifty per cent. of the root could be well filled by ordinary methods. Owing to this bad showing, had we not better try some other methods? As we rarely fill the small canals, we need some method of mummifying their contents so as to avoid trouble. He then gave a history of previous efforts to preserve tooth-pulp remains. Söderberg's paste is made by the formula—burnt alum, two parts ; thymol, two parts ; glycerol, two parts, with oxid of zinc to form paste. Söderberg had had complete success. In cases extracted, he had found the pulp completely mummified. The method was, after drilling out the pulp-chamber, to leave the canal contents and fill the chamber with paste. Specimens from the Söderberg were shown,—also some the writer had prepared. The pulp-remains were parchment-like and white from the oxid, and the surrounding parts completely blanched. The writer had practiced the method since last November,—had used it in forty cases with no bad results. One hundred cases had been reported by others without failure, but the time is not yet long enough to test it thoroughly.

Dr. H. S. LOWRY, Kansas City. The man who uses this method is one who has not been successful or is too lazy to work for general use. But he sees where it would be useful in cases where we could not get to the end, or where the canal cannot be entered at all. It should not be employed except where the canals can be entered and cleansed properly.

Dr. L. E. CUSTER, Dayton, Ohio. There is no need of such a method, since cataphoresis supplies a sure method of medication. It has been found that the current of electricity will follow the line of moisture to the end of the canal, and a salt or an acid can be carried entirely to the apex.

Dr. C. L. HUNGERFORD, Kansas City, Mo. The idea of filling a cavity with a soft substance in a porous state is illogical and absurd. It is only the extraction of the moisture from the canal contents by the paste. That part is still subject to the absorption of moisture from the tubuli, and putrefaction will set in later, low inflammation will be around the root, even if the teeth should be tolerated. Such teeth will not be natural. Blind abscesses often remain for years without making trouble, but the disease is still there. The method is shiftless and impracticable. The antiseptic will gradually disappear by absorption, and the infiltrated moisture decompose. By the cataphoretic method medicine can be driven in perfectly. Removal of the organic contents and antiseptic filling is the only successful method that ever has been or ever can be devised for the filling of root-canals.

Dr. PATTERSON. If he thought for a moment that even a small per cent. of those present believed or would practice this method, it might be worth while to oppose it. It is so unscientific and impracticable that no one can accept it. It is practiced in the old country, and he is glad it did not emanate from an American. They are so indolent over there that they do not want to make any effort to do things as they ought to be done. So the mouths of Europeans become full of abscesses and other sequelæ of diseased pulp-canals.

Dr. KENNEDY, St. Louis. Dr. Patterson touched the right chord, but he did not hit it hard enough. One of the other great objections to this method is that it will betray a man into slipshod methods of work that will follow him into other departments and curse him as long as he lives.

Dr. SLATER. There are very few canals that cannot be opened up well or their contents removed. Dr. King's investigation showed that it was merely the work that was imperfect. We do not need this method if we do our work well.

Dr. A. W. SWEENY, Washington, D. C. The thought struck me that the fee system that prevailed in Europe had something to do with such shiftless methods. They collect for visit and not for operations, and so try to avoid protracted and tedious operations. Dr. Abbot, of Berlin, says that in Germany the native operators in the treatment of root-canals ignore the contents, because it does not pay to do anything else. So, easy methods are practiced without regard to the results, which the people take as a matter of course. The legitimate place for such procedure as the paper advocates is where you cannot possibly treat and fill otherwise. In all ordinary cases you should fill the root-canals, for the orthodox method is the best one.

Dr. B. L. STEPHENS, Hannibal, Mo. Nothing can take the place of a perfectly filled root.

Dr. —— and others spoke of having seen numerous cases of root-canals treated by the Herbst method, which were in very bad condition.

Dr. PATTERSON. In regard to Dr. King's investigations and exhibit, one can fill roots better in the mouth than out. I have tried it. We are not accustomed to doing such work in the vise on the bench, but in the mouth. On this account the failures in these cases are not a fair test of the ability of the operator.

Dr. KING. I do not know from my experiments which is the "orthodox method," for all methods fail in some cases. It is always puzzling to know just when we are absolutely at the end of a root. The normal canals should have been well filled in these teeth. I do not believe that the majority of operators could do any better in the mouth than in the plaster.

Dr. DE FORD. It would be only in difficult cases that I would employ the method described in my paper. Dr. King has shown that we do not remove the pulp-substance and fill roots as well as we ought to do. This method is for those difficult cases where we cannot fill the root, and only for the inaccessible canals would I recommend it.

Dr. C. E. ESTERLEY, Lawrence, Kan. My clinic was a porcelain crown. I made the metallic portion as usual, molded porcelain paste over it, and it was fused in Dr. Custer's furnace.

THURSDAY, JUNE 25.

The morning was devoted to clinics.

The meeting was called to order at 2 P.M. by Dr. J. T. Abbott, Iowa State Dental Society.

After miscellaneous business Dr. W. W. VANCE, of Kearney, Neb., presented a paper on "Electricity and Its Uses in Dentistry." He spoke first of the various kinds of currents; there are two kinds in which we are interested which are furnished by the commercial companies: First, the constant, and second, the constant potential. The common direct current is that used for arc lighting. The constant potential is always of the same voltage, one hundred and ten volts, which is the best for the general uses of the dentist. Heating appliances require ampere strength, but not voltage. Eight amperes is required for dental heating purposes, hot-air cautery, etc. Cataphoresis is one of the latest applications of electricity, but is yet undeveloped.

Dr. C. L. HUNGERFORD. The best text-book for the beginner of the study of electricity is the ordinary High School book on physics. Begin with the primary elementary questions, and then proceed to the higher class of literature of the subject. The men who do the mechanical work of our calling, who make the application of scientific principles, are those who meet with greater success in dentistry than those who devote themselves to chemistry or physics. We have a high, liberal calling as mechanics, but do not stand high as electricians or chemists. It is through pure mechanics that filling, treating pyorrhea, and the most of our other work is performed. On account of his mechanical ability the American dentist is in advance of the world,—not on account of his scientific knowledge of therapeutics or physics. Electricity has a wide field, and now is being applied even in therapeutics. To run an electrical apparatus we must have some primary knowledge. As to cataphoresis, if it can be considered that electricity is a mode of motion of ether,—and that is the generally accepted opinion now,—we see the possibility of the application of a mechanical motion. In cataphoresis the medicine is forced into the tissues by a mechanical process. The vibrations carry the agent into the tissues by their mechanical process. Anesthesia is a paralysis of the terminal filaments of nerves in some mysterious manner. Some agents have the power of inhibiting the carrying of sensation. Cocain is one of this class, also carbolic acid, guaiacol, etc. Cocain-guaiacol is the best combination. With this substance placed in the cavity, the positive electrode is placed on that and it is carried into the substance of the dentine. But the action is only felt half-way between the poles, therefore there must be a re-application on the opposite side, or there must be two positive poles, with the negative somewhere else, say held in the hand. Again, we have the application of electricity to the baking of porcelain, as has been beautifully illustrated here. He has the current arranged in his office for all purposes, at a very small expense. By controlling the current you can get just what you want, either with an ampere motor or by an appliance for shunting. The time for the application of cataphoresis depends on the density of the tooth, the agent used, etc. With the ordinary electrodes salts of the metals are formed at the ends of the terminals, so he uses platinum electrodes in the application of cocain. It takes, with his apparatus, from five to ten minutes to get the effect. He generally prefers the old method of freezing with chlorid of ethyl first, and its effects may be hastened with compressed air driven upon it. He has little use for the cautery, except for cutting the gum from over a third molar or drying out a canal.

Dr. CUSTER, Ohio. In regard to cataphoresis a few things are desirable. The current must be constant; it must not change, or there will be a shock, so the moisture must be kept regular. Then it must be applied gradually at first, and then raised as seems to be required. The Edison or a galvanic current are the best. The anodes must be held perfectly quiet. The sensibilities of the patient are so delicate that the pulse of the operator can often be felt. Then the enamel is not a good conductor, but acts like glass or porcelain. The dentine must be laid bare to the last tubule, for it is through the moisture of the tubuli the current flows. Every tubule must be exposed, or it will remain sensitive. The cocain must reach the pulp through the tubuli, or their sensitiveness will not be allayed. Then all metals must be kept isolated. The clamp must be kept away, or it will carry off and waste the current.

Dr. S. S. NOBLE, Wichita, Kan., had used cataphoresis, but could not get the effect so soon as ten minutes. Had a case of very sensitive cavities which took thirty minutes with thirty per cent. solution, but the effect was complete from first to last.

Dr. AMES, Chicago. One feature of this work is the danger of the leakage, or a loss of current, which often makes failure in getting an effect. A metal filling even must be protected by an insulator, or part of the current will be carried away. He knew of such causes producing failure. The scope of the possibilities of cataphoresis is unlimited. The products of the decomposition of the metals of the electrodes can be used in a therapeutic way. Such agents can be employed in pyorrhea and pus-sacs. He had used the principle of decomposition to get local effects years ago, but sees now that the process was cataphoresis.

Dr. HUNGERFORD. The X rays he had experimented with, with high alternations, and employed cocain with the static breeze, but no effect was produced. There is nothing in that so far as his experience goes.

Dr. L. C. WASSON, Topeka, Kan., read a paper on "Co-Operation." In old days robbery was practiced as a business, but in our day it is accomplished by corporations which buy up patents and bleed people by a system of license fees. Dentists are peculiarly susceptible to this method of robbery, and fortunes have been paid out by them to such piratical organizations. It is so much easier to pay small sums annually than to fight. So the average dentist would rather do that than go to the expense of time, money, and trouble to fight a company trying to extort a license fee or royalty from him, etc.

Dr. J. N. CROUSE, of Chicago, then addressed the meeting at length on the purposes, success, and prospects of the Dental Protective Association.

Evening Session.

Dr. Abbott in the chair.

The report of the morning clinics was made by Dr. LOWRY. He also gave a list of new appliances. Some of the clinicians described their operations.

Dr. HUNT described an apparatus he had recently received from Paris for producing anesthesia by freezing, but without many of the disagreeable effects of some of the old processes. He thought that refrigeration had a special place in producing anesthesia of the parts for lancing abscesses, where there was much swelling and tenderness.

Dr. F. M. SHRIVER described his process of attaching porcelain facings after soldering, thereby avoiding the danger of cracking. He backs up with platinum and then with another piece of platinized gold to carry over the edge of the tooth to make a hard biting surface. A polished gold edge does not cut so well as a sharp edge. The palatal face of an artificial incisor should be convex like the natural tooth, and with a sharp cutting-edge. After soldering the bridge, slightly countersink the pivot holes, set the teeth on in soft cement, press out surplus, grind the pins down, place the teeth on soft tea lead, and rivet the pins down with a small riveting hammer. The advantages are that the teeth are saved from the danger of cracking in heating, and are more flexible in the mouth, and escape breaking in that way.

Dr. J. D. PATTERSON read a paper on "Surgery of the Maxillary Sinus." On account of contiguity of the sinus to the superior molar roots, disease of these latter often extends to the antrum. Diseases of these teeth are too often treated without investigating the antrum, especially in obstinate and chronic cases. The treatment of diseases of this cavity has not been properly taught, so that the ordinary practitioner is not at all skilled in their diagnosis. The utmost skill is often demanded in making a correct diagnosis. The symptoms are often obscure and deceptive. When from a diseased tooth the diagnosis is often simple, but from other causes is more obscure. When the teeth are not affected, the symptoms are often similar to, and are often mistaken for, a severe coryza. The teeth do not respond, and there is no redness or swelling. The most ordinary and evident signs are not present. Sometimes an electric lamp in the mouth will show through the antrum and cheek, but even the translucency cannot be depended upon. The new X rays may prove valuable in diagnosing diseases of this kind. When the usual symptoms are present,—heat, swelling, distension, etc.,—and are plain, there is sufficient ground for operating. The diseased tooth should be extracted, and this alone will often effect a cure. When chronic, however, this will not be sufficient. The antrum must then be opened, and there has been much dispute as to the proper place for performing this operation. He has found that the best place generally is the lowest level of the space formed by the triangle of the three roots of the upper first molar. First sterilize your instruments in resorcin or cassia water. All instruments and surroundings must be aseptic. The engine makes such work much easier and more rapid nowadays. The trephine shown should be first used, with little pressure, as it will progress rapidly. When the cavity is reached, a flow of diseased matter will come. After this is well evacuated, follow with the larger instruments until you can insert the little finger and explore all parts of the cavity, and see as much of it as possible. Wash with antiseptic liquids and dress as may be necessary, with water at 100°, with a pinch of salt to allay pain, which it will do. Tumors and growths must be removed with curettes. These are difficult to treat, but can be removed successfully and a cure effected (as described in a case given). It may be safely said that even malignant growths may be removed and a cure effected if taken soon enough. Complete bony walls isolate the growth, and a perfect cure can be attained by their removal if taken before the bone has become affected.

Dr. HUNT. The more familiar we become with these conditions, the better for us and for our patients. The dental and oral surgeon can perform these operations better than the general surgeon, for he would open up right through the cheek, and we would operate through the mouth, thus avoiding the unsightly scar. In diseases of the molar roots there is often mere hypertrophy of the lining membrane, and only simple treatment is necessary. In more advanced disease cauterization is often necessary, and then dressings of antiseptics. The main point is a good opening. He likes it big enough to get his finger in and feel all parts of the cavity. Sometimes there is a septum across the cavity, entirely or in part. It is necessary to break this down in order to reach all parts. Microscopic examinations, except by those familiar with the changes of tissue that take place in the oral cavity, are not reliable. A fistulous opening is sometimes diagnosed as cancerous by those not familiar with oral diseases. A little tumor on the lip is often a mere hypertrophy, although the cell-formation may seem to be similar to sarcoma.

Dr. A. H. THOMPSON. It is very necessary for the general practitioner to familiarize himself with diseased conditions of the antrum, that he may not be deceived or allow them to escape. Here, as in orthodontia, he should be in touch with the specialists, although he cannot expect to attain their skill in treating difficult and obscure conditions. But he should be able to treat simple cases in a simple manner, and for safety refer the more difficult cases to the specialists.

Dr. PATTERSON. There will be no difficulty in getting the opening to close, no matter how large you may make it, except in those cases where extensive necrosis or operating has destroyed a large area of the walls of the cavity. Then there will be healing, with a large vacancy which will need to be filled with a plate restoring the lost teeth also.

Mr. WILSON, of Lexington, Mo., by special invitation read an excellent paper on " A So-called Abnormal Form of the Jaw." This is the form where the jaw protrudes so that the lower incisors close over on the outside of the upper teeth. In " Old Virginia" this is called "jimble-jaw." Jimble, being a folklore word, is not found in the dictionaries. The tribes east of the Baltic sea were called "Sterling." Those of the west were the Scandinavian stocks. The *Esterlings* emigrated from the Baltic to England and Wales. There were two main stocks of people in Europe,—the Cimbrians of the north, who were a light, tall race ; and in the south the short, dark people. The Cimbrians, or *Kimberlings*, of the north had the protruding jaw. It was an essential feature of the Kimberlings, and the antique skulls of the north often show it. The Kimberlings were a fierce and warlike people, and the jaw was closed with the determination of an energetic and aggressive character. They had an elongated face, and helmets are found made to fit such a face and the protrusive jaw. They were jimble-jawed men. This form of jaw has also much to do with the origin of certain sounds in our language, as it led to the protrusion of the tongue beyond the upper incisors in speaking some words. The Romans depicted these people with protruding tongues in derision. The protruding jaw came from the early eating of horseflesh and other tough kinds of food. The horse was then used for food only, and this employment of horseflesh survives to-day only in France and Belgium. This form of jaw decreased on account of softer food due to cooking and other effects of civilization. The intermarriage of the two kinds of people produced a mixed stock in America. The jimble-jaw is more common in the Southern United States than in the North, where the folkword is never heard. But in the South the jimber-, or kimber-, jaw is common.

A vote of thanks was given to the writer for his interesting paper.

Dr. A. H. THOMPSON read a paper upon "The Characteristics of the Teeth in Relation to Temperament."* Discussion was postponed until the next session.

FRIDAY, JUNE 27.

The morning was devoted to clinics.

The meeting was called to order at 2.30 P.M. by Dr. A. D. Griggs, President of Missouri State Dental Association.

The discussion of Dr. Thompson's paper being in order, Dr. HUNT said that the variations of the higher and lower animal life as given in the paper did not apply to the human family. The normal angle of the European face is about ninety degrees, and as it varies from this we are likely to have degradations. Where the muzzle is longer, prognathism is greater than at ninety degrees. Temperament is the classification of the ordinary variations of persons. It should be studied in the arrangement of the teeth, as they are very important to the prosthetist, especially in mouths where the teeth are all gone and the assistance of the natural teeth as guides is lost. It is of imperative necessity in such cases to know the temperament of the individual. Single types of temperament are rarely found, but in every individual you can discern the basal temperament, and each one has a distinct type of tooth in color, form, size, and other characteristics. The literature on the subject is rather meager. The contributions of the Flaggs, Dr. White, and a few others, are all we have on the subject. Older practitioners judge between persons instinctively, but they judge by the signs of temperament.

Dr. STEVENSON. Dentists do not give enough attention to the teeth in regard to temperament. The teeth of the bilious temperament do not require as much care in operating as, for instance, those of the nervous temperament, as they are not so likely to give subsequent trouble. As the temperament of the individual is, so are the teeth, and they should be treated accordingly.

Dr. PATTERSON. A writer has asserted that he could tell the temperament of a person from the teeth alone, as the basal temperaments give pronounced types of teeth. Others question if there are characteristic types of the temperaments. He thinks we have a proper guide in selecting teeth for a case in the natural teeth, some of which should be saved when the last are taken out. Temperament is not a sure guide in selecting teeth, for it is not of much service in diagnosing their characteristics. If you attempt to carry out the idea you will often find yourself very much mistaken and at sea, for the temperaments are so mixed that you are soon lost. But in regard to pathological conditions, temperament is a much more important matter, for here it is a sure guide. Some temperaments respond to treatment easier than others. So it is very important to consider temperament in pathological conditions.

Dr. HUNT did not like the way Dr. Patterson talked. If he was selecting teeth for an entirely edentulous case, would he not look at the color of the eyes, hair, skin, etc., and choose accordingly? Of course he would. He cannot get away from the necessity of discriminating between persons. Old practitioners select teeth according to the general features, and that is temperament. Temperament is also important in considering and treating pathological conditions.

---

* See page 630 of the current number.

Dr. THOMPSON must insist on the importance of the study of the temperaments from an anatomical and artistic standpoint. The keynote of the paper is classification. We see great differences in the people around us, and their variations are due to various physical conditions which, for convenience, we call temperament. As there are great differences between persons it is surely important, from a scientific standpoint, to classify these differences. And as these extend to the teeth, and each temperament presents a distinctive type of tooth, it is important that these should be classified and studied for the service and benefit of the dental operator and prosthetist. That is the object of the paper. As regards the pathology of the temperaments, that is also important. In the treatment of disease it is wise to consider the temperamental tendencies and its bearing upon treatment and prognosis.

Dr. D. J. McMILLAN, of Kansas City, Mo., then read a paper on "The Uses of Gold in Dentistry." Each form of gold has its place, and for which it is best adapted. Non-cohesive gold has its place, but its merits have been too much lost sight of in practice. We too often compromise on amalgam for a troublesome cavity,—*i.e.*, one for which it is too difficult to adjust the rubber-dam, or the patient is nervous and can't endure the strain; for children, etc. In many of such cases we could use non-cohesive gold. Then again its use is more inspiring, and leads up to a better quality of work in general. We can still use it to advantage by the old methods. Many good things have been lost by its abandonment. The newer non-cohesive gold does not equal the old soft gold in many respects. It cannot be contoured, of course, but cohesive gold can be used for that. He then gave a detailed description of the methods of using soft gold, illustrated by charts.

Dr. ABBOTT had discussed this question of soft gold forty years ago. The principles that are described and illustrated here are the same as were in use then. Soft gold is still unexcelled for use in many places, and he does not know why he and others stopped using it, but supposes it was because non-cohesive gold became the fashion and fad. He had recently examined fillings he had put in in 1852, and found them still good and doing service.

Dr. WOODBURY had used soft gold years ago. He employed the strips and ribbons, however, not the cylinders, as described by the writer. He has a soft gold filling in his mouth now that was put in forty years ago. He also changed to cohesive gold perhaps only because it became fashionable.

Dr. PATTERSON had never given up soft gold entirely, especially for margins, because its adaptation is so much more perfect. It is especially valuable at cervical margins. It has its place and its uses. It can be used with much ease in children's teeth or other places without the rubber-dam. It does not matter if moisture does get to it, it will work well. It is also a pulp-protector. It is loose, and not a homogeneous mass like cohesive gold. He uses it in the bottom of deep cavities, under cohesive gold fillings, or even under amalgam or cement. It is a great thing for protecting the pulps. You have all seen those old soft gold fillings which extend almost to the pulp, which you thought would have made trouble, but did not. If you put a cohesive gold filling or even amalgam in these cavities, you will have trouble immediately from sensitiveness; and why? Because your new material is a better conductor of thermal changes than the old soft gold filling you took out, with its loose structure and cavities and layers of air.

The committee on the permanent organization of the Interstate Association made a report. They had taken Dr. Thompson's paper under consideration, but they had decided that the plan was not feasible. They decided to report that in their opinion the Interstate Association should be made permanent, and that another meeting should be held in 1900; also that other states should be invited to take part in that meeting, and that it should be held at such time and place as the Executive Committee should decide. To carry out the plan, they would recommend the appointment of an Executive Committee consisting of one member from each of the state societies here gathered, and that other state societies that should accept should each also appoint a member.

The report was received and adopted, and the following members of the Executive Committee of the Interstate Meeting for 1900 were appointed:

Kansas, Dr. C. E. Esterley; Nebraska, Dr. H. T. King; Iowa, Dr. Keener; Missouri, Dr. Orr.

After resolutions of thanks to the Executive Committee for their labors in behalf of this meeting, which were carried to such a successful issue, and to the proprietor of the Elms Hotel for courtesies and other business, the meeting adjourned.

The Interstate Meeting of 1896 was pre-eminently successful in every particular. The attendance was about two hundred and fifty, and the interest in the sessions and clinics was unabated from beginning to end.

AMERICAN MEDICAL ASSOCIATION—SECTION ON DENTAL AND ORAL SURGERY.

(Continued from page 583.)

SECOND DAY—*Morning Session* (Continued).

DR. E. S. TALBOT read the following paper:

PYORRHEA ALVEOLARIS.

Paper No. 3.[*]

This disease is evinced by simple inflammation of the gums around the teeth, followed by chronic inflammation with or without suppuration, with or without calcic deposits, a gradual destruction of the peridental membrane, with recession and absorption of the alveolar process and gums, concluding with loosening and exfoliation of the teeth. The physician is more familiar with this disease, as it appears to him as a consequence of scurvy, mercurial or iodid salivation.

---

[*] Paper No. 1, DENTAL COSMOS, 1886, page 689; paper No. 2, *ibid.*, 1896, page 310.

I wish to express my obligations to Dr. W. Evans, pathologist, and Dr. W. H. Knapp, for photographs for this paper.

Few diseases have received as many names as that under discussion. More time has been spent in apology for and discussion of new names than in original research as to its etiology. The term pyorrhea alveolaris, which has become so popular, and which I have selected for the title of this paper, does not elucidate the exact condition, since many cases which come to the dentist do not suppurate.

Riggs's disease seems a more appropriate title, since to it is affixed an exact clinical picture of the various stages, from simple gum inflammation to wasting of the alveolar process and loss of teeth.

Many theories have been advanced as to the cause of this disease. None require discussion at this time, except the uric-acid hypothesis advanced by Dr. Reese, of Galveston, Texas, May, 1885, and most forcibly advocated by Professor C. N. Peirce. This theory owes its prominence more to the eminent position of Professor Peirce than to the intrinsic value of the experiments upon which the theory is based. Of these he remarks,*—

"I have had three specimens of this tooth deposit examined chemically by Professor Ernest Congdon, of the Drexel Institute, whose experimental skill is a sufficient guarantee for the accuracy of the results obtained.

"Specimen No. 1 contained, as shown by microscopical analysis, a number of fine needle crystals of calcium urate, a few crystals of free uric acid, and crystals of calcium phosphate. Destructive distillation analysis yielded a strong ammonia reaction. The murexid test for uric acid and its compound was faint, though the characteristic color showed in several places.

"Specimen No. 2 presented the same crystals on microscopical investigation. The murexid test was strong, producing a number of purplish red spots.

"Specimen No. 3 yielded similar results.

"In addition to these three analyses by Professor Congdon, some six or eight specimens were examined by my friend and colleague, Professor A. P. Brubaker, M.D., D.D.S., in my library in my presence; the results obtained corresponding to those of Professor Congdon. In three of these, an abundance of urate of soda crystals were observed. It must be remembered that, as the quantity embraced in each specimen was small in amount, large results could scarcely be obtained or expected."

The publication of Peirce's researches led to investigations of the question, which demonstrated to me that patients may suffer with uric-acid diathesis without pyorrhea or even chronic gum inflammation. Moreover, most people over forty years of age are afflicted to a greater or less extent, while comparatively few have either lithemia or gout.

Certainly no physician would claim that resultant loose teeth were consequent upon scurvy or mercurial poisoning, uric acid much less. From the comparatively doubtful results obtained in so few cases, the

---

**International Dental Journal*, January, 1894.

claim seems far from warranted that pyorrhea is caused by uric acid or gouty diathesis. Since I prepared my second paper,* I have continued my examination with the view of obtaining the percentage of cases which actually show uric acid. These examinations were conducted personally by Dr. Jerome H. Salisbury, of the Northwestern University, Women's Medical School. The teeth procured from institutions which make a specialty of extracting were all selected by the writer. All contained the dark calcic deposit above the pus line.

Dr. Salisbury reports thereon as follows :

"I have examined a second series of three hundred teeth by the murexid test and microscopically with the following results : by the murexid test, six out of the three hundred gave a distinct reaction ; eighteen showed crystals under the microscope. The murexid test was performed as follows : The deposit was selected as carefully as possible, removed from the tooth, and placed in a small porcelain crucible. A drop of pure nitric acid was added, and the mixture evaporated on the water bath. When dry, the evaporation was repeated with another drop of nitric acid, and the crucible allowed to cool. When cool, the color produced by the nitric acid was observed, and then a glass rod, wet with ammonia water, was brought near the deposit, and any color produced was noted. If no color was observed, the ammonia was allowed to flow over the residue. A yellow color was produced in many cases by the nitric acid, which was deepened by the addition of ammonia. The microscopic examination was made by scraping off the deposit and evaporating it with a drop of hydrochloric acid. The residue was moistened with water, and the insoluble material placed on a slide and covered with a cover-glass. It was examined with a No. 7 objective. We may assert that uric acid occurs in a certain but very small proportion of cases of calcic deposit on the teeth."

Dr. J. A. Wesener, after an examination of several teeth from patients over forty-eight, under treatment for uric acid, reports that the murexid test was negative and uric-acid crystals were absent. Since there is some doubt whether the crystals are free uric acid or calcium phosphate crystals (both resembling each other), and since but six out of three hundred responded to the murexid test, it would seem justifiable to accept as a fair average twelve as responding to both tests. This would give four per cent. of cases in which uric acid was present. This corresponds closely with the results previously reported in my second paper upon this subject, when five per cent. was found. It will be remembered that the two hundred and fifteen cases were examined independently by two chemists of known ability.

While one-fifth of the five hundred and eighteen cases examined had decided lithemic or gouty symptoms, but three and one-half to four per cent. gave positive results by the chemical and microscopical examination. These results seem sufficient to demonstrate conclusively that pyorrhea was not due to uric acid, and that uric acid when found is merely an expression of uric-acid diathesis. As so many colors are observed in the porcelain crucible, these examinations should be made by expert chemists.

---

* April Cosmos, and *International Dental Journal.*

Ten years ago* I published some observations on pyorrhea, which it was hoped some one proficient in microscopy would take up and pursue the investigations to the end, but these seem not to have attracted attention. Among the points then made was that pyorrhea was on the increase, that a large majority of patients suffered more or less from it, and that modern dentistry had most to do with the cause ; that it was of local origin.

I still hold these opinions, since clinical experience in the different asylums of this country and Europe, as well as close observation of my office patients, has given me a broad range to study the etiology of this disease.

Dr. E. Magitot, in 1867, published the most complete paper upon this subject, describing the disease in its progress to the end, but says that the gum being in all cases attacked subsequently only, is not the real seat of the lesion. The disease with which we are occupied, he says, "seems essentially characterized from an anatomical point of view by a slow and progressive destruction of the periosteal membrane," a destruction of an inflammatory character, of chronic progress, proceeding from the neck to the end of the root, and leading, without fail, to the loss of the tooth. This special feature, its mode of origin, and the precise seat of the lesions, seem to justify the name alveolo-dental periostitis. But, notwithstanding its primary origin in the periosteum and its complications with the gum and bony alveolar wall itself, the study of the successive morbid phenomena does not allow us to admit, as various authors have claimed, that these parts are originally the seat of the disease. Dr. Peirce takes the same view.

I hold just the opposite : that the gum is the first tissue attacked, and that these parts are originally the seat of the disease.†

Clinical observation shows that in the incipient stages of pyorrhea active and chronic gum inflammation and calcic deposit may attack one, two, three, or even four teeth at once. General invasion of all the teeth *never occurs* at the same time, which would be the case if it were of constitutional origin. The calcium salts being in solution in the blood, are deposited. Only local conditions favor such deposits, which militates strongly against the uric-acid theory. As Ziegler remarks, "the cause of calcification is for the most part to be found in local changes of the tissues, since the deposits of lime-salts usually occur in localities in which the tissue has already died or is in process of degeneration and necrobiosis." It looks as if dying tissue which has undergone more or less modification possesses a kind of attraction for the lime-salts in solution in the body, and enters into intimate combination with them. Among the degenerating or dead tissues which are particularly prone to undergo calcification, we may mention in particular connective tissue which has undergone hyaline degeneration, such connective tissue being quite often encountered in the walls of the blood-vessels in the endocardium, in an enlarged and degenerated thyroid, or in the thickenings of the pleura or pericardium. It is common also in degenerative areas in the walls of blood-vessels, or in tumors, or in any other portion of the body in which hyaline and fatty degeneration are in progress, in degenerating cartilage, in dead cell bodies, as for example in dead ganglion cells or kidney epithelium (especially in corrosive sublimate, aloin, or bismuth poisoning), or in circumscribed cheesy areas of considerable size.

---

* DENTAL COSMOS, 1886, vol. xxv, p. 689.

† See original paper, General Pathology.

When a tooth associated with pyorrhea has been extracted, clinical observation shows that the margin of the peridental membrane has changed its locality. Instead of being in its normal position at the neck of the tooth, it has receded in a more or less irregular line toward the apex of the root. The extent of this recession depends upon the duration and power of resistance of the disease.

The membrane, instead of being thin and of a pink color, is quite thick and of a deep red. The inflamed membrane may extend through the entire length of the root, or in circumscribed localities. The space upon the root made vacant by the destruction and loss of the peridental membrane may be quite clear and smooth, or it may possess calcic deposits. These deposits may consist of a uniform ring extending around the entire tooth, or circumscribed masses of deposits may be located at different points about the root. As the membrane recedes, the deposits follow after it upon the root or roots.

Between the border of the calcic deposits and the peridental membrane is a space, one to two lines in width, where the root or roots of the tooth are perfectly smooth. This is the pus-line of clear, smooth tooth-structure, and is nearly always situated between the calcic deposits of the peridental membrane, showing that the calcic deposits are not always found in the membrane, as Dr. Peirce claims. The space upon the root of the tooth between the peridental membrane and the neck of the tooth, including the calcic deposits, is bathed in pus. This disease, which first makes its appearance as an inflammation of the gums, is due to irritation from constitutional and local causes.

Constitutional causes are tartar, mercurial salivation, potash iodid and other drugs, syphilis, loss of vitality, locomotor ataxia, paretic dementia, and the menstrual nisus. In neurotic and degenerate classes, as a whole, pyorrhea exists to a greater extent than in the more healthy classes. In any and all of these diseases in which systemic disturbances produce trophic changes, this disease is present.

Local Causes.

As has already been shown, modern dentistry is producing more pyorrhea than any other one cause. Some cases result from infection, from micro-organisms, application of the rubber-dam, clamps, wedging the teeth, correcting irregularities, sharp edges of decayed or filled teeth, protruded fillings, spaces between teeth, crown- and bridge-work, overstimulation in the use of the toothpick, artificial teeth, more particularly ill-fitting plates, injuries, tartar, accumulation and decomposition of food and collections around the necks of teeth, tobacco, and everything of a foreign nature, as observed in the mouths of idiots, imbeciles, epileptics, and all individuals who do not take care of the teeth. The result of irritation from constitutional and local causes is inflammation. The constitutional factors merely produce inflammation of the gum-margins and trophic changes.

Light is thrown upon this subject by a careful study of the anatomy and physiology of the parts involved. We have the root or roots of a tooth on the one hand, and the bony structure of the alveolar process on the other, and between the two resisting walls we have the peridental membrane, composed of fibrous elastic connective tissue, which gives nourishment to both the tooth and the alveolar process. The alveolar process is a transient, bony structure simply for the purpose of holding the teeth in place after they have been erupted. The gum or mucous membrane which covers the alveolar process, and which is united with the mucous membrane throughout the mouth, connects with the peridental membrane at the margin of the process. That the lymphatic system is richly developed in young people at this locality is demonstrated by the fact that when the temporary and permanent teeth are lost, the alveolar process absorbs. No structure of the body is similarly situated as the peridental membrane. The structure of the tooth not changing its former size, sends very little nourishment into the cementum.

The peridental membrane obtains its blood-supply from the arteries at the apex of each root, just before they enter the foramen, and through the alveolar process, but the largest amount passes through the gingival border of the gum.

According to Black* (and I have since verified this statement), "these capillaries run longitudinally from either end of the root toward the center, giving off branches which enter the alveolar process, but not the cementum, because of the peculiar locality of the membrane." May not the anatomical position and a physiological action on this membrane have something to do with the disease?

The changes which take place in structure are excellently described by Richard Thoma.† "The occurrence of atheromatous degeneration is not limited to epithelial structures, however. It is also found in connective tissue. The pathological new formations of connective tissue, which so frequently develop in the intima of the large arteries, are especially liable to atheromatous degeneration. In the description of the simple hyaline degenerations, it was mentioned that many general disturbances of nutrition lead to a weakening of the middle coat of the vessel. The vessel wall is stretched by the blood-pressure, the lumen of the vessel dilates, and connective tissue thickening of the intima takes place, so that the lumen of the vessel becomes again adapted to the blood-strain. Not infrequently this stretching of the middle coat of the vessel becomes very excessive at some parts of the circumference of the vessel, and accordingly the new formation of connective tissue is very considerable. The newly-formed connective tissue has now to support the great part of the tension of the walls. For this, however, it is not quite competent. The increasing dilatation of the lumen of the vessel continues to stretch the wall, until at last the nutrition of the newly-formed connective tissue is impaired, some portions of it die, and undergo simple hyaline degeneration. In the hyaline portions a finely granular disintegration, with softening and liquefaction, develops under certain circumstances. This softening is atheromatous degeneration. These areas of softening occur, as a rule, in the deeper, oldest connective tissue layers of the intima, nearer the media. They may, however, break into the lumen of the vessel, or sometimes extend to the media. Atheromatous degeneration, like simple hyaline degeneration, is associated with increase in volume and swelling of the degenerating parts, so that the atheromatous foci project somewhat into the lumen of the blood-channel.''

---

* "American System of Dentistry."

† "General Pathology and Pathological Anatomy," p. 398, 1896.

Substitute the peridental membrane for the middle coat of the aorta, and this describes the changes which take place in this locality to a more marked degree, owing to the location of the membrane between the bony walls, and contain more connective tissue.

The gums are rarely found in a healthy condition. They may become inflamed from either constitutional or local causes mentioned above. If the cause is removed early and antiseptic and astringent washes used, together with the stimulating effect of the tooth-brush, the gums will return to a healthy condition. The peridental membrane is never invaded by pus-germs so long as it is in a perfectly normal state. If, on the other hand, inflammation of the gums, due to either constitutional or local causes, persists, it will extend to the capillaries of the peridental membrane, causing inflammation and stasis of blood in that direction. The peridental membrane has not lost all of its source of nourishment, although the greater part is cut off; its vitality is thus impaired.

When inflammation of the peridental membrane takes place, a proliferation of small round cells produces a new connective tissue. This tissue causes inflammation and thickening of the peridental membrane, which is subject to necrosis, first, from its position between the two bony walls, causing pressure, and second, from deficient blood-supply.

Atheromatous patches, composed of granular débris, and granular débris and fatty detritus, in which are deposited lime-salts liberated from the tissue-cells and from the blood or lymph, are then formed. These patches soon become infected with pus-germs, or infection of the tissue in the primary stage of the inflammation may take place.

These pus-germs, according to Miller, are found in nearly every mouth, but more especially around the necks of teeth. Infection means degeneration and liquefaction, not only of the immediate tissue, but also of the more healthy peridental membrane, but in a less marked degree.

Pus infection producing pockets are formed first by circumscribed inflammation at a particular point of the gum or peridental membrane at the neck of the tooth. The inflammatory process extends into the peridental membrane along a blood-vessel or lymph-stream. This may extend part of the entire length of the root of the tooth, the tissue degeneration taking place in precisely the same manner as before, only in a circumscribed way. In phthisical patients and those with low vitality, and patients who have been ill for any length of time, a low form of inflammation of the gums, extending to the peridental membrane, with pus infection, takes place, and degeneration of tissue ensues with or without granular patches and calcic deposits.

The granular débris or calcic deposits in all cases are a secondary consideration in this breaking down of tissue, the inflammatory exudate and pus formation being primary.

Sometimes the degeneration of tissue will extend the entire length of the root. The atheromatous patch of degeneration is always located in that part of tissue farthest from the blood-supply or at the point of least vitality, hence the reason of the breaking down of membrane and deposit upon the root of the tooth.

Believing that the disease is due to local atheromatous degeneration, I have continued my investigations with the aid of Dr. Vida A. Latham, of the Northwestern University Woman's Medical School. Loose teeth, the result of pyorrhea, were extracted and placed in fifty per cent. alcohol, and given to her for preparation for the microscope. The illustrations here presented are some of many she has prepared, and are magnified 480 diameters. These illustrations, other than the first, which is normal, are pathological conditions of the peridental membrane in different stages of inflammation and degeneration.

Fig. 2. Lengthwise section of cervical portion of the mucous and peridental membrane in connection with a central incisor. Man, fifty-four years of age. *aa*, epithelium ; *b*, coarse fibrous tissue of the gum connecting the mucous and peridental membrane, the lymph-stream passing through from one tissue to the other ; the tissues are in a state of chronic inflammation ; *c*, deeper connective tissue.

Fig. 3. Cross-section of peridental membrane of the anterior buccal root of a right superior first permanent molar. Man, fifty-nine years of age. The dark lines show round cells, inflammation extending along the lymph-channel ; the lighter lines less inflamed, membrane center ; *a*, blood-vessel.

Fig. 4. Cross-section of peridental membrane of left superior lateral incisor. Woman, thirty-two years of age. This tooth became loose on account of pressure from plate. The white spaces show nicely the fibers of the connective tissue. The dark spaces are round cells of inflammation extending into the lymph-streams, showing how pus-pockets are produced.

Fig. 5. Cross-section of peridental membrane of left inferior central incisor of a young lady twenty-nine years of age, a dressmaker who has been under my care for fourteen years. By treatment I was able to preserve this tooth that length of time, but I finally had to remove it. The disease first started by accumulation of tartar between the two incisors. She was in the habit of biting her thread with this tooth. I could not prevent her from occasionally doing so until it became loose, and she had to stop as a matter of necessity.

This illustration is similar to No. 4, the black center showing active inflammation extending along the mesial surface, with cross-section of two blood-vessels, with violent small-cell inflammation, having for its starting-point the perivascular lymph space.

Fig. 6. Cross-section of central incisor and peridental membrane. *a*, dentine ; *b*, cementum ; *c*, cementoblast ; *d*, peridental membrane highly inflamed ; *e* and *f*, blood-vessels cut longitudinally.

The following four illustrations show different stages of inflammation and degeneration of the peridental membrane of a right superior first molar. A lady, forty years of age. She has had pyorrhea for the last twenty years, and is now losing her teeth very rapidly.

Fig. 7. Cross-section of palatal root near apex, showing connective tissue with active inflammation.

Fig. 8. Cross-section farther down, showing further stage of inflammation of peridental membrane, with all sizes and kinds of connective-tissue cells.

Fig. 9. Cross-section still farther down on same root, showing further stage of inflammation.

Fig. 10. Cross-section lower down and of lower magnifying power; shows degeneration and liquefaction of tissue. *aa*, two pus-pockets with violent inflammation around them; *bbb*, violent inflammatory areas about to break down; *c*, blood-vessel.

The following cases are here given to show that uric acid and the gouty diathesis are not the cause of pyorrhea.

A, fifty-eight years old, woman, has been a patient for sixteen years and has all the symptoms of gouty diathesis. The enlarged joints of her fingers and toes indicate this, together with neuralgic and rheumatic pains in limbs and body. All these years she has come to my office as often as once in every three months, and frequently as often as twice a week (except when out of town), to have her mouth kept in order. I removed two loose teeth when she first came to me in 1880, and the remainder are firm in the jaw to-day. I have been able to keep them in a fairly good condition ever since. I have had the greatest trouble with the inferior incisors and the palatine surface of the superior incisor. I have kept the gums in a fairly healthy condition without calcic deposits, and have neglected the buccal surfaces of the molars. The patient has done the same. This was her weak point, therefore I encouraged it. The result is that where the gums are kept healthy there is no deposit, and where they had become diseased the deposit was excessive. When the deposits were removed they were examined chemically without uric-acid results. This case has already been reported in second paper.

B, forty-nine years old, man, came to me eleven years ago with a very bad case of pyorrhea. His dentist had been treating him for three years without favorable results. His business being outside work, he enjoyed the best of health. The right inferior first molar was loose, and I informed him that I could do nothing with his mouth as long as it remained. He reluctantly had it removed, and in less than two months I had his mouth in a healthy condition. For six months I watched it to see that he followed my instructions, which he did faithfully. He had very powerful muscles, and soon after the time mentioned he neglected to get the brush back by the right upper second and third molars. In a short time inflammation of the gum set in, and deposits took place, while the remainder of the mouth was in a comparatively healthy condition.

C, twenty-two years old, woman, had her anterior superior teeth regulated owing to a protrusion. This required four months' time. After they had been restored to their proper position they were anchored to the first bicuspids. She was dismissed, and after a year had passed I removed the retaining band, and found chronic inflammation of the gum along the palatine surfaces of the incisors and cuspids, when she did not reach them with her tooth-brush, with thick calcic deposits.

D, fourteen years old, girl; had the upper dental arch expanded, and the anterior teeth rotated and carried back into place. This required two years' time. After the appliances were removed calcic deposits

FIG. 1.

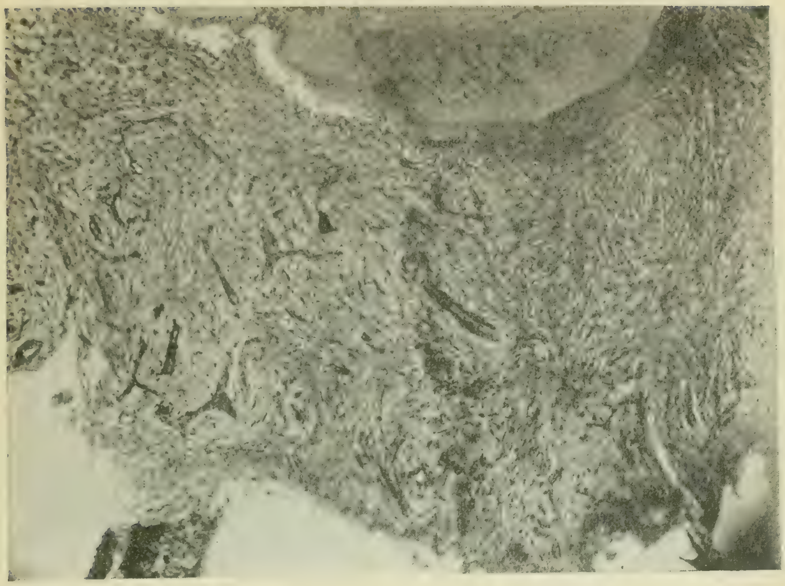


FIG. 2.

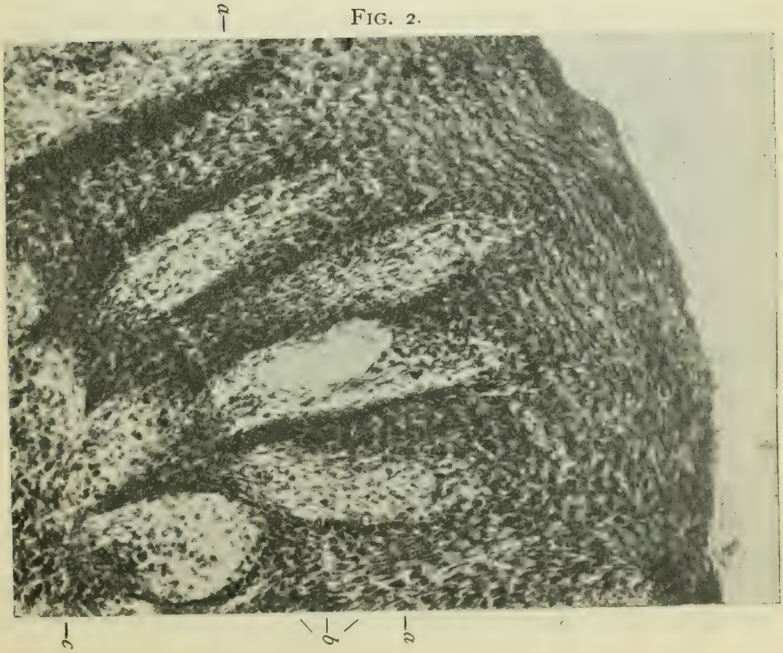


Fig. 3.

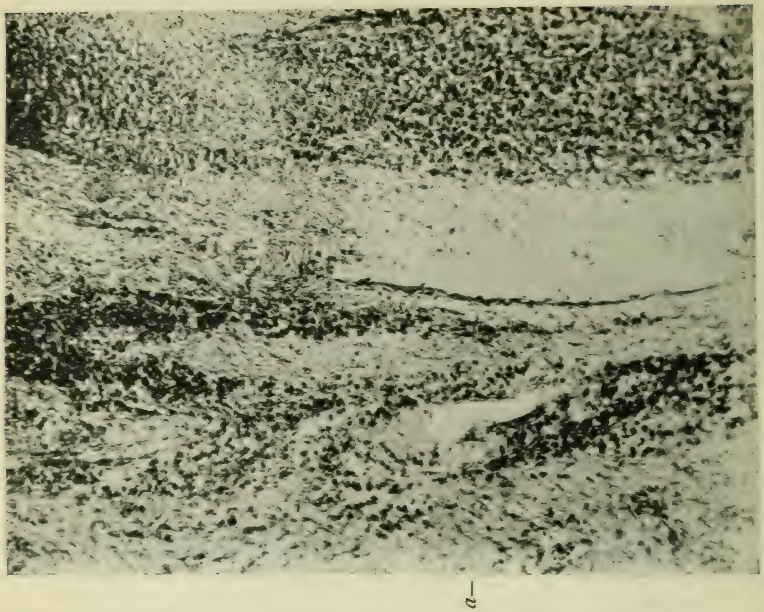


Fig. 4.

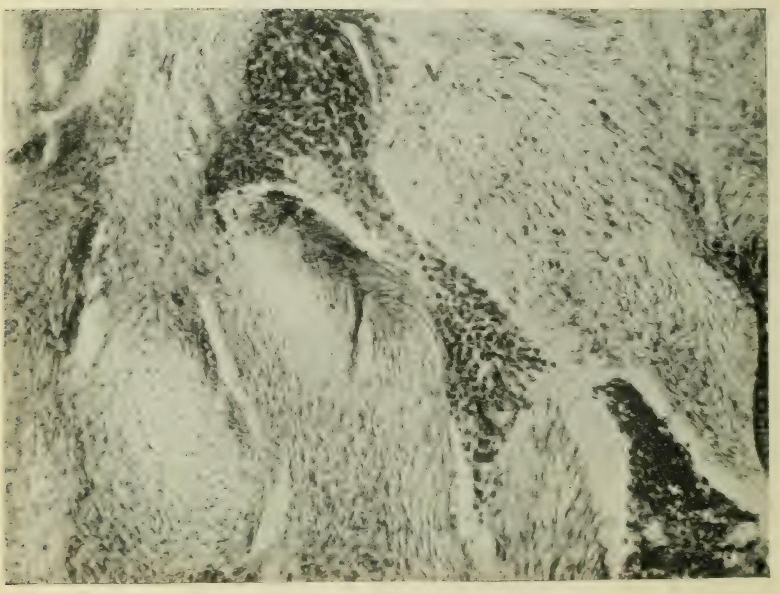


FIG. 5.

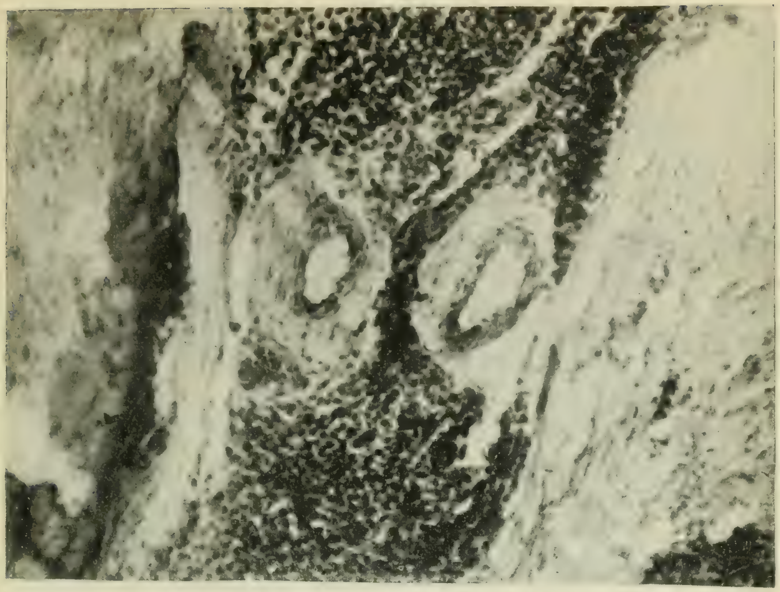


FIG. 6.

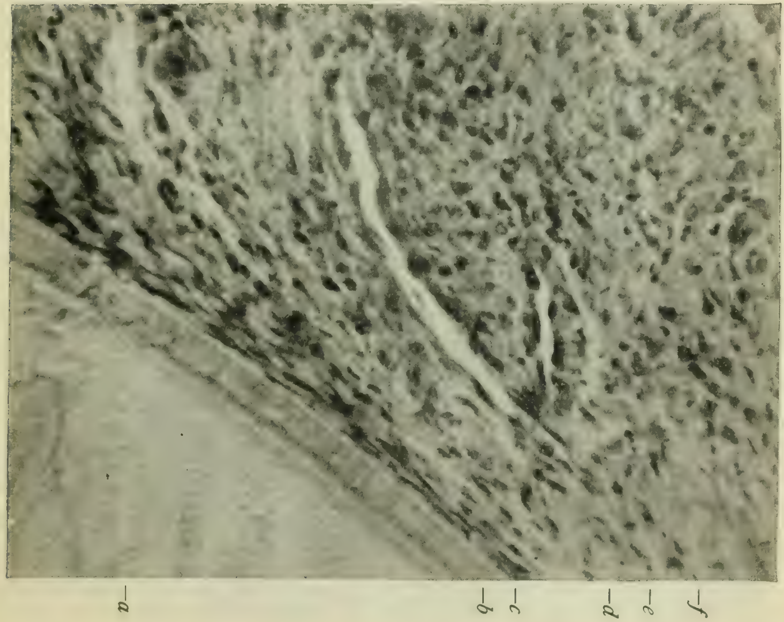


Fig. 7.

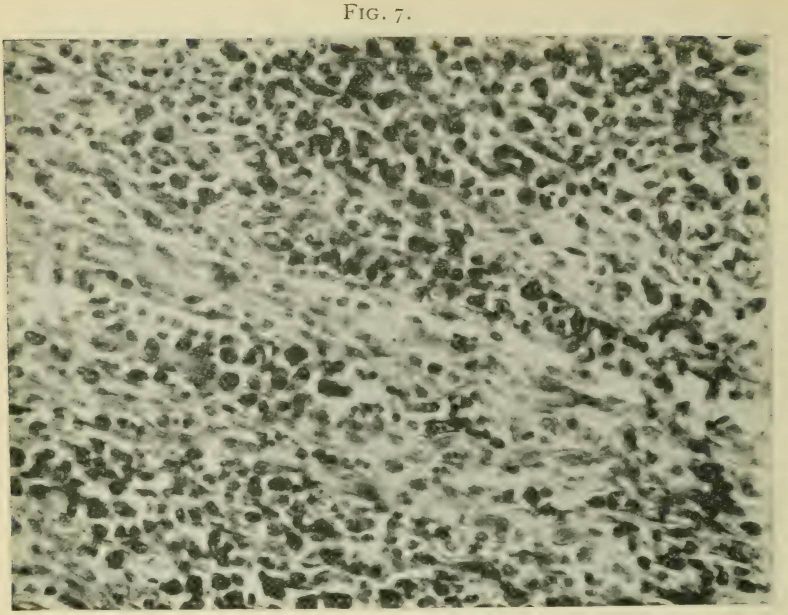


Fig. 8.

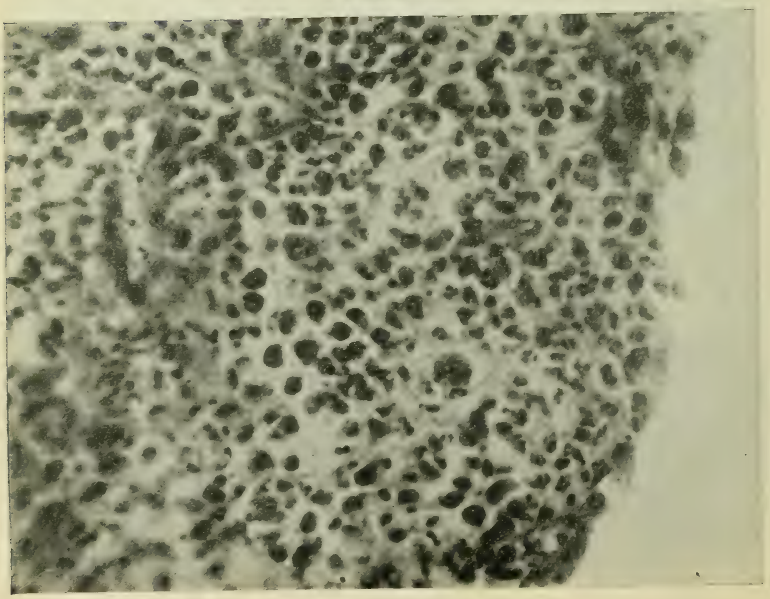


FIG. 9.

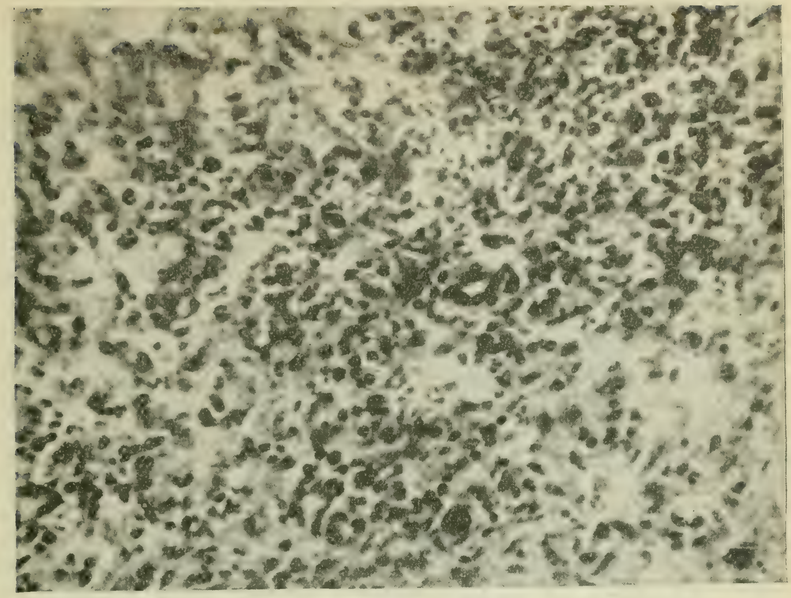
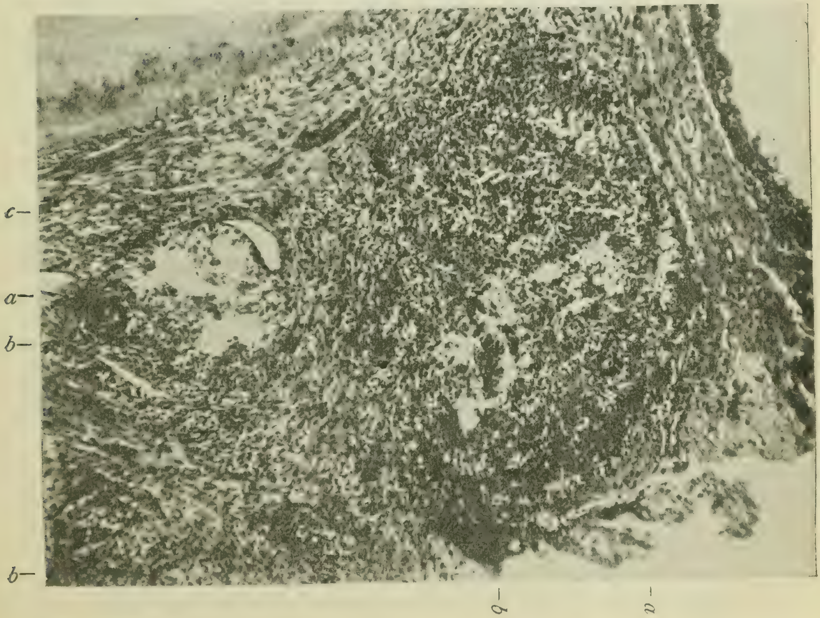


FIG. 10.



were found in connection with all the teeth banded on the upper jaw, while no deposits were observed on the lower. It will be observed that had the gum been kept in a healthy condition no deposit would have occurred. Many similar cases could be cited at length, but would seem redundant.

The glandular structure in the peridental membrane decreases with age. Black says, "In young subjects glands are found in great profusion lying along the fibers close to the cementum. Their number is so great that I have counted from one hundred to two hundred of them cut across in the cross-section of the root and alveolus of an incisor tooth of ordinary size." They seem to diminish in numbers as age advances, though this point has not been studied sufficiently. I have examined one hundred and twenty healthy and diseased peridental membranes, and have succeeded in finding only a few glands. This, no doubt, is due to the fact that all patients examined were over thirty years of age. There can be no question but that the number of glands in the peridental membrane greatly diminishes as life advances. There is, however, a set of glands located at the gingival margin of the gum, which remain so long as the tissues are in a healthy state. When, however, chronic inflammation takes place, these, to a certain extent, are destroyed. These glands invariably become involved in scurvy, mercurial and iodin salivation, and in many cases of syphilis and other constitutional conditions which affect the gum-margin. In such cases, whether due to constitutional or local causes, acute inflammation occurs which, if not cured, becomes chronic, and extends to the peridental membrane, and the small round cells of inflammation follow the blood and lymph streams, which may affect the membrane as a whole or only in circumscribed masses. When this is the case pus infection takes place and total destruction of the peridental membrane results, or pockets are found. In anemic cases the vitality of the membrane is greatly impaired, and inflammation and atheromatous degeneration occurs.

I cannot understand why Dr. Peirce and his disciples advocate the uric-acid and gouty theory when the only evidence in even the three or four per cent. of cases, the only link in harmony with the two conditions, is the name calcic deposits.

The clinical features of the beginning and process of the two diseases are wholly unlike; we never in pyorrhea see deposits taking place and accumulating in large quantities within the peridental membrane not exposed to the acid. In gouty deposits in the joints, we never find the primary deposits starting from the external surfaces intermingled with pus. The advocates of the uric-acid theory are quite content to prescribe for their patients suffering with pyorrhea, a glass of hot water three or four times a day, in which a tablet of from three to five grains of lithia has been dissolved. What effect does that have upon the ninety-five per cent. of patients who do not have uric acid? What dentist will know when he has one of the five per cent. cases to treat, since they all resemble one another? Why use the lithia? It is wholly unnecessary. Chemists will tell us to flood the system of gouty patients with good, pure water, which will carry away all the insoluble substances in the blood.

There are physicians in this country with international reputation who are treating and curing patients other physicians have given up, of typhoid fever, pneumonia, syphilis, constipation, smallpox, acute Bright's disease, cystitis, and other allied diseases by the simple use of water alone. The blood of a gouty patient can be cleansed by flooding the system with distilled water in precisely the same manner. But for the sake of argument let us use lithia water for one of those cases in which we have found uric acid by the murexid test, and also crystals. The deposits are located upon the root of the tooth from one-fourth to one-half the distance of the root, with inflammation of the peridental membrane (which is always present) and most always pus. Do the advocates of this theory believe that by removing the calcium salts in the blood it will have any effect upon those lymph and blood streams, which have become invaded by cells of inflammation and infection, far beyond the pus line as illustrated in Figs. 3, 4, and 5? It would seem to me to be folly to think of such results. Treating pyorrhea at random, without knowing the cause, reminds me of a clinical lecture I heard in 1880 upon asthma. The lecturer said, "Gentlemen, the etiology of this disease is very obscure, nor do we know how to treat it. I would advise you to question the patient and find out what he has been taking, and if it relieves the paroxsym, continue it."

In this enlightened age random treatment will not do; we must get at the cause, and relief is easy when taken in time. Dr. Riggs and hundreds of other dentists are treating the disease locally with perfect success in those cases where the disease is not so far advanced. Admitting that the first symptoms of pyorrhea are simple inflammation of the gums, recognized by their bleeding, after removing all foreign substances, the use of a medium stiff brush and an astringent mouth-wash stimulates the gum; continue this treatment until they are hard and do not bleed, and keep them so. There is the secret of the whole situation, and the first point in treatment; the longer we wait, and the longer the disease progresses from one stage to another, the more difficult the treatment and the less assurance of success. If chronic inflammation of the gum has extended to the peridental membrane and pus-infection has ensued, scarify or mutilate the gums in removing the deposits so as to remove as much blood as possible, afterward saturate the gum with the officinal tincture of iodin. This treatment should be kept up two or three times per week until the gums are hard and tight about the teeth; the second point in treatment. Care being taken to remove all foreign matter and accumulation; in cases where calcic deposits have taken place, we must not forget that inflammation of the membrane and pus-infection has preceded it. The deposit being the result, we must therefore be careful not to injure the membrane in removing it; the third point in treatment. We must not carry the instrument toward the apex of the root, thus wounding the membrane, but very gently carry the instrument beyond the deposits, and draw it away from the raw edge of the membrane. By removing the deposit we must not flatter ourselves that we have removed the cause, and therefore the disease will take care of itself. There is beyond this deposit and even beyond the parts of degeneration and liquefaction of the membrane a diseased connective tissue which cannot be reached by local treatment, and in such cases we must disinfect the parts with germicides and antiseptics;

the fourth point in treatment. Constitutional treatment in the form of tonics is here indicated to restore the membrane to a healthy condition ; the fifth point in treatment. In most cases it is useless to expect to cure a peridental membrane after the tooth has become loose in the socket, and therefore should be extracted ; the sixth point. The inflammatory cells have penetrated the lymph and blood-streams throughout the entire length of the root, hence the difficulty in reaching them. The margin of the alveolar process should not be cut away except to reach the edges of the peridental membrane with the drugs. The main points to consider in such cases are to disinfect the space between the root and alveolar process, including the edges of the peridental membrane, and contract the gum tightly about the necks of the teeth to prevent the accumulation of foreign matter and pus-infection. I have used the officinal preparation of tincture of iodin with success as above mentioned. I know nothing better. Pyorrhea due to trophic changes, as observed in locomotor ataxia, paretic dementia, spinal injuries, and all defects in neurotics, must be treated constitutionally as the case may require.

Discussion.

Dr. W. J. YOUNGER, of San Francisco, said he would not go into a scientific study of the etiology of the disease because the profession were not certain about it, but he thought that many who studied it were approaching the theory that he had advanced some years ago, that it was an effort of the system to remedy a condition by a deposition of salts in the form of badly organized bone. He considered it a disease of the pericementum. The first step in the treatment was to carefully remove every particle of the calcareous deposit, avoiding wounding the gum, then make an application which will bring about a union between the gum and the tooth. Iodin will not do this, and should not be used except on the outside of the gum. Lactic acid will cause the union to take place. It should be injected into the pocket. He claims to be able to cure twenty-four out of every twenty-five cases by this treatment. It takes a very delicate sense of touch in the fingers to be sure that there is no deposit left. He spoke of a case shown him by a member of the Stomatological Club of San Francisco. This gentleman said he had removed every particle of deposit, but still the pus flowed freely. Dr. Younger examined it, and found tartar still in the pockets, and told the dentist to remove this and treat it according to his directions, and it would be cured. He reported two weeks after that all the teeth were cured except one, which he said was a dead tooth. Upon making an examination, tartar was found, but the dentist could not be made to feel it. Dr. Younger, however, removed it, and the tooth was cured. His method of using the acid is to warm it slightly, which makes it more fluid and lessens the pain which the application of cold acid would cause, and with a platinum-pointed syringe inject it, placing the point of the syringe clear to the bottom of the pocket and withdrawing it as the acid is injected, so as to avoid pressure. One application is all that is necessary. The outside of the gum should be protected from the acid by an application of vaseline and a barrier of cotton. Usually after the acid has been injected you will find there has been an exfoliation of the pocket, and next day the gum will be found clinging close to the root. If the union is perfect you need do nothing more. If it is not perfectly united, see if you can find any more calcareous deposit and repeat the lactic acid. Then keep the mouth aseptic. Treat one tooth at a time ; when all have been treated, the condition will be cured and will not return. Do not wash out the acid. One dentist who came to him for counsel carried out the treatment faithfully, but after applying the acid washed it carefully out again, and of course failed.

Dr. TALBOT asked Dr. Younger if he did not mean contraction of the gum around the teeth, rather than union.

Dr. YOUNGER said, no ; he meant union, and so perfect that the finest instrument could not be inserted between the gum and the tooth without bringing blood.

Dr. CATCHING asked what instruments were used for removal of the tartar.

Dr. YOUNGER said that he did not use any of the special sets of instruments made for the purpose, but prepares them for himself to suit his purpose. In order to promote sensitiveness of touch, he surrounds the handle of each instrument with a ball of sealing wax where the ends of his fingers grasp it, which also gives him a better hold in making a pushing cut. By having wax of different colors, he is able to distinguish easily by a glance the special instrument wanted at any time without examining the point.

Dr. R. B. ADAIR, of Gainesville, Ga., said he had been studying cases of pyorrhea for several years, and in his practice had a great deal of it, and believed it as amenable to treatment as any other dental lesion. Many of his cases treated years ago had had no return of the condition. He caused a complete union of the gum to the teeth where it had been possible to pass an instrument quite to the end of the root. He did not agree with Dr. Talbot as to the cause, and, though a close observer, had never seen a case without calcareous deposit. He had seen cases where the peridental membrane seemed intact where there was an external issue of pus. He used the Allport instruments with a push motion to loosen the tartar, and then scraped it all out carefully with the spoon-shaped instrument. He had never used lactic acid, as he knew it was very destructive to tooth-substance, but would try it when he had an opportunity.

Dr. G. V. I. BROWN, of Duluth, had been studying this subject in his practice for several years. There are four important steps in treating the disease. The first is to remove all deposits. If this can be done by instruments, then no drugs are necessary ; if all cannot be thus removed, he applies acid to dissolve the remainder. The second step is to get the gum to unite with the tooth ; the third is to determine whether the disease is a cause of systemic disease or a result. He thought it was more frequently the cause. He did not believe in the theory of rheumatic diathesis as a cause, nor Bright's disease, but thought that pyorrhea was a cause of different forms of nephritis. Every year he treats his cases of pyorrhea less and less. If he can remove all the deposits at one sitting, nothing further is required ; if one is not enough, he concludes that all deposit is not removed, and he uses acid. Malocclusion is a frequent cause of pyorrhea, as it causes inflammation of the alveolus and a deposit of calcic material, and should be corrected. He did not quite understand what Dr. Younger called cured; cases which he considered cured would have a recurrence of the disease in after-years, and it would have to be cured again. He makes his own instruments as he needs them, mostly out of fine excavators.

Dr. YOUNGER said by "cured" he meant the removal of all trace of the disease and the restoration of the mouth to perfect health. He mentioned the case of a lady who went to a dentist in San Francisco with her teeth so loose that they could be removed with the fingers. The dentist told her it was impossible to do anything but extract and insert a plate, but the lady was unwilling that this should be done, and consulted Dr. Younger, who in the course of three weeks cured the disease so thoroughly that every tooth was firm, and the gums perfectly united to them quite to the edge. Six years have now passed with no recurrence of the trouble. In answer to a question, he said he secured the teeth with silk ligatures until they were firm in their sockets.

Dr. WALKER, speaking of the theory that pyorrhea was due to the action of lithic acid, said that he did not see that the fact that this acid did not attack all the teeth was an argument against the theory that this was the cause, neither was the fact that all patients who have lithemia do not have pyorrhea. In some cases this disease attacks the fingers, in others the toes, in others the lungs, etc. Since Dr. Peirce wrote of this subject Dr. Walker had found only one case where he could not find other symptoms of lithemia, and in this case the disease was due to malocclusion, and there was no deposit of calcic material, though the flow of pus was constant. The examination of the urine is not conclusive as to the existence of the lithic acid diathesis, as sometimes it does exist when no trace can be found in the urine. We also know that by excess of food gouty and rheumatic trouble can be brought on, and Dr. Kirk says the same excess will cause trouble with the teeth. Does this not prove that this trouble is caused by the lithic acid from the circulation, and could it not be that the rheumatic condition should be brought on by such a debauch, and the deposits about the teeth made, and then the condition cure itself or be cured by a course of abstemiousness, but the deposits remain and the local trouble continue? In such a case examination of the urine would give a negative result.

Dr L. D. CARPENTER said that in the most aggravated cases in his practice there was no deposit at all, but a relaxed condition of the gums, with a flow of pus which apparently washed out the serumal salts into the mouth. He had always used dilute sulfuric acid to remove deposits which he could not get out with instruments. He never thought possible the close union of the gum to the tooth which Dr. Younger got after treatment. He used astringents to secure contraction of the gum around the teeth, but did have return of the disease.

Dr. WALKER said, by saying that the disease was cured he did not mean that it could not return, but that it was cured for the time. If the cause persisted or returned, the condition would recur.

Dr. CATCHING said that very few men were so well informed as to be entitled to an opinion as to the cause of this disease, but it will be so authoritatively settled some day as to stop all discussion as effectively as was the discussion on the etiology of dental caries by the publication of the experiments and deductions of Dr. Miller. He thought the proper name for the disease was "Riggs's disease."

Dr. TALBOT spoke of the importance of determining the cause of the disease, if possible, so as to have a sure basis upon which to found rational treatment. Until this is done treatment must be experimental. He spoke of the importance of keeping the mouth in an aseptic state after the deposits are removed, so that pus-germs could not invade the pockets before the gum had united with the teeth.

Discussion closed.

Dr. THOS. P. HINMAN, of Atlanta, Ga., described a case of replacement of the superior maxilla by a mechanical appliance. The paper is printed in full in the July number of the DENTAL COSMOS, page 559.

(To be continued.)

UNION MEETING OF THE MARYLAND STATE DENTAL ASSOCIATION AND THE WASHINGTON CITY DENTAL SOCIETY.

(Continued from page 600.)

FIRST DAY—*Afternoon Session* (Continued).

DR. WM. A. MILLS read a paper on "A Plea for the Higher Scientific Education of the Individual Members of the Dental Profession."

Dr. Mills's paper was a clear presentation of the subject embraced in its title. The author took positive exception to the idea that the manipulative side of dentistry and its high cultivation by the practitioner is all that should be required of a competent dentist. The great need in the present high-stage development in dental requirements was an improvement in the ability to diagnose diseased conditions, which could only be achieved through more thorough study of the scientific foundations upon which the art and practice of dentistry rests.

He was not of the opinion that the medical degree was essential to successful dental practice, but that more study should be given to medical essentials, and the habit of systematic scientific study cultivated and maintained throughout professional life.

Discussion.

Dr. A. W. SWEENY said a paper of this character cannot well be discussed, as we have only one opinion on the subject: the dentist needs a broad education which will enable him to understand the symptoms of diseases when such symptoms are present. Certain conditions in the mouth indicate disease of other parts of the body, and the dentist's education should enable him to recognize these symptoms and know their meaning.

Dr. WILLIAMS DONNALLY agreed with the essayist upon the necessity for the extension of education and the broadening of the scientific knowledge upon which the profession of dentistry rests as a foundation. The broadly educated man is a more competent dentist than the one whose hands only have been trained. In the education of dental students, too much attention has been given to merely manipulative training. A worthy member of the dental profession is more than a man possessed of a certain aptness of manipulation in the dental art. The science and art are separate, both desirable, both essential, but it is the science which justifies our claim as a profession and as a part of the medical profession. Dental science cannot be separated from medical science. The development of the dental profession has been made possible only by separating the dental specialty from the medical profession and the separate establishment of dental schools and colleges, but the medical profession furnish fully two-thirds of the professors in the dental schools, and thus loans its scientific teaching to raise up the dental profession. The manipulative part of the dental education receives sufficient attention from the students, but the broader fundamental scientific knowledge is too much neglected.

Dr. W. A. MONTELL believed in broader education and a closer knowledge of medical science for dentists, but thought that the main point was to know more of dentistry. If dental students were better trained in general education before beginning their professional course, they would have more desire for scientific professional studies and be better able to acquire and master them. Guided by a wider collateral education, the acquisition of dental education and manipulative ability should be the aim of the dental student. Practical manipulative work is the main object of our profession, and should receive the best efforts of the dental schools.

Dr. E. P. KEECH had always favored higher education for all coming into the dental profession. Some one once said that if he had a boy of whom he wanted to make a dentist he would first send him to a university, and when he had graduated from that he would send him to a medical college and afterward to a dental college, when, if he had not learned to smoke and had not been crippled playing foot ball or base ball, he would expect to make a fair dentist of him. Dr. Keech took exception to the medical college as unnecessary. Every dental school should teach all the medicine necessary for a dentist. A certain amount of medical knowledge is needful ; the course of the medical student and that of the dental student coincide up to a certain point, where they should separate and each go farther in his own direction. He claimed that, with the exception of the general surgeon, the dentist was better educated, as a rule, than was any other specialist in medicine. He held the degree of M.D., but did not value it at all. All he got of professional education which was of use to him he got in the dental schools and from clinical observation. The first impulse was given to dental education by the establishment of the first dental college, of whose faculty only one was a member of the medical profession.

He did not believe it would be profitable for the general dentist to undertake original investigation as a rule, because few have the time or inclination for such work. We have a few, however, as Miller, Black, and others, and their number and ability compare favorably with such workers in other specialties or in general medicine.

He took exception to what the essayist said about the necessity of dentists being better able to diagnose diseases. He believed the general dentist to be as good a diagnostician as the general physician. The most important improvement to the dental profession would come when better educated men entered it; then the people would be brought to appreciate the profession and expect more of the dentist.

Dr. H. B. NOBLE thought that the greatest need was better preliminary education as a means of keeping unworthy men out of the profession. Dentistry is generally recognized as a specialty in medicine by medical schools, and many of them have come to teach it as a specialty and grant the dental degree. The danger is that we will not get enough practical training in dental work from the schools, as the instructors in the dental infirmaries are generally young men who have not the ability to teach that more experienced practitioners would have. It is difficult to get successful practical experienced men to undertake such instruction.

Dr. WM. B. FINNEY said that the schools would be glad to have the services of the best men in the profession as instructors, but that they could not compensate them for their services.

Dr. J. B. RICH said this difficulty had always existed. The first dental college would have been established in New York city, but when the organizers tried to choose instructors they met a difficulty. The man whom they desired as instructor in mechanical dentistry asked where the eight thousand dollars a year that he should want for the work was to come from. His time was worth this much, and he would not accept the position for less. This broke up the plan of locating in New York, and the college went to Baltimore, where instructors could be got who did not demand eight thousand dollars. This difficulty had always existed, and it would always be the greatest difficulty in dental education. What was wanted was not so much better preliminary education as better teaching in the colleges. Dental students need knowledge of all the arts and sciences, but this they can get afterward, but in the dental college they should be taught to do dental work properly. In medical schools you will find the greatest and best physicians and surgeons are teaching, but in dental schools it is not so. Our profession requires a great deal of us; we must be medically educated and have rare judgment and delicate manipulative ability for operative work; for prosthetic work we have to be artists, with a knowledge of dynamics, mechanics, sculpture, and chemistry; and beside all this, to succeed, must be to a high degree gentlemen.

Dr. MILLS, closing the discussion, feared his paper had been misunderstood. He did not desire to have it thought that he was ashamed of the degree D.D.S.; not at all: he only thought that there was a need of broader education in the dental colleges. Education is the only aristocracy in this country, and the more education the dentists have the more worthy they are of respect as professional men. Dentists are now better educated in their specialty than physicians are in general medicine, and we have leaders in our profession who are equal to any man in any profession. The bulk of the profession should try, however, to keep a little closer to the leaders if possible. He would like to ask how a dentist who was not to some extent medically educated would treat a case of bleeding in the mouth, the result of vicarious menstruation? He supposed such a dentist would have stopped the bleeding by putting an impression tray full of plaster in the mouth of the patient.

Subject passed, and the convention adjourned to meet at 8 P.M.

Evening Session.

The meeting was called to order at 8 o'clock, and Dr. D. L. Huntingdon, Deputy Surgeon-General U. S. A., read the following paper:

It is with much pleasure that I respond to the invitation of the chairman of your joint committee of arrangements to make a few remarks relative to the Library of the Surgeon-General's Office and Army Medical Museum, in connection with the resolution adopted by the thirty-sixth annual meeting of the American Dental Association, formally recognizing the Library of the Surgeon-General's Office and Army Medical Museum as the National Library and Museum of the dental profession of the United States.

In acknowledging the honor thus conferred upon us, I have, as librarian and officer in charge of the library and museum division of the Surgeon-General's Office, communicated with your chairman, stating that we shall be most happy to co-operate with your committee, and with the dental profession of the country, in forming a collection thoroughly illustrative of all matters pertaining to the subject of dentistry, and trust that, with an increasing knowledge of our facilities, a genuine interest may be manifested in carrying into execution a work so important to you and advantageous to ourselves.

It has, therefore, seemed proper that I should give you a very brief account of these institutions, which are so well known to the medical profession at home and abroad, as well as of their scope and capabilities, that you may feel assured of the wisdom of your action in selecting them as the national repository for all matters of interest pertaining to your specialty.

Previous to the late Civil War, the Library of the Surgeon-General's Office was composed of a few hundred books on medicine and surgery and collateral branches; very much such a collection as might naturally collect in the office of the chief of an important bureau.

Few additions were made to this collection until the year 1865, when Dr. John S. Billings, then an assistant surgeon of the army, was detailed to take charge of it. Dr. Billings at once recognized the value of the opportunity thus presented for laying the foundation of a great national medical library. As a result of his energy, knowledge, and judgment, we have to-day the magnificent Library of the Surgeon-General's Office.

In the earlier years of its growth this collection was placed in the old Ford's Theater building, which, after the tragic assassination of President Lincoln, was purchased by the Government and turned over to the medical department of the army for the use of the Library and Medical Museum.

Aided by liberal appropriations from Congress and directed by the energy and perseverance of Dr. Billings, the growth of the library has been phenomenal. In a few years its constantly increasing size and value, as well as the continual menace of destruction or damage by fire in the old and exposed building, made it imperative to provide secure and ample accommodations elsewhere.

In 1886, Congress passed a bill appropriating the requisite funds for the erection of a spacious, fire-proof building. This building, located near the National Museum and Smithsonian Institution, was completed and occupied in 1887. From that date to the present time its growth has been continuous, until it has now come to be acknowledged "the most complete medical library in the world," containing on its shelves to-day about one hundred and twenty thousand volumes of bound books and about two hundred thousand pamphlets, together with a most valuable collection of atlases of plates and engravings illustrating anatomy, surgery, physiology, and obstetrics.

In its general scope the library is intended to cover the entire field of medical and surgical literature, making it possible for the student to avail himself of the writings and teachings of all countries and all times, with the least possible loss of time and labor. While intended mainly as a reference library, a certain latitude is observed by the management with a view to making it as useful as possible to the medical profession, and especially to students and writers, by loaning to well-established medical societies and libraries of prominent medical colleges such books as may be called for, upon the condition that these bodies will guarantee the care and return of books loaned, and be responsible for all losses and damages which may occur.

Rare and valuable books and manuscripts, plates, unbound books and theses, whose loss cannot be easily replaced, are not loaned.

Connected with the library is a reading-room, where all the current journals and periodicals are kept on file for the convenience of those desiring to consult them. To those making special studies in any line of the profession we are prepared to afford all possible facilities.

The annual list of journals and periodicals subscribed for and received at the library amounts to over eleven hundred, and embraces all subjects pertaining to the literature of medicine at home and abroad. The machinery for the increase of the library is complete. Through agents in all the principal cities of the world, we are constantly receiving not only the current and latest medical literature, but frequently have the opportunity to secure rare and valuable works of past centuries. The appreciation in which this library is held is best evidenced by the frequent and large donations of books and pamphlets from every source, among which are many duplicates of works in our possession, which afford us the means of obtaining desirable additions through exchange.

The library receives its main support from the liberality of Congress. Since the year 1867 up to the present time, the appropriations of this body for the support of the library have averaged about seven thousand dollars annually, which enables us, with a fair degree of certainty, to keep our journal files complete and make very considerable additions of new books, as well as insuring a small annual amount for the purchase of old and rare books and curiosities of medical literature. The practical value and utility of this collection is proven daily by the members of the profession, who make regular use of the facilities offered,—by the interest shown by medical men from the United States and from abroad. The reading-room is constantly occupied by readers, students, and investigators. This vast wealth of medical literature is made accessible to the profession through the medium of the Index Catalogue, which is at present comprised of sixteen large octavo volumes of about one thousand pages each. This work was begun in 1879, and has progressed continuously at the rate of one volume per year. The catalogue is arranged by authors and subjects, and may fairly be considered "as practically an index to all the medical literature of the world up to the end of this century."

The large accessions of material since the publication of any one of the volumes are carefully carded, and will appear in a second series of volumes, the first of which is now in the course of preparation, to be followed by as many more as may be required, and dependent upon the continued liberality of Congress. A comparatively small edition of these volumes is printed, and is distributed mainly to medical libraries, medical colleges, and to certain of the larger public libraries of the United States and Europe.

By reference to this Index Catalogue, Vol. III, 1882, under the proper heading of "Dental," "Dentists," and "Dentistry," you will find not less than six closely-printed pages, or thirteen columns, referring to works and journals under these captions. Since the publication of this volume, the additions to the library on these subjects have been very large, and will be printed in their proper volume of the second series.

Of journals and periodicals pertaining to dentistry, our list embraces all of the best throughout the world, and from our agents we are continually receiving the latest works on the subject.

The Army Medical Museum, occupying the eastern wing of the building already alluded to, is also of comparatively recent origin, and owes its existence to ex-Surgeon-General W. A. Hammond, who, in 1862, issued a circular stating that it was "proposed to establish in Washington an Army Medical Museum," and directing medical officers of the army "diligently to collect and forward to the office of the surgeon-general all specimens of morbid anatomy, surgical and medical, which may be regarded as valuable; together with projectiles and foreign bodies removed, and such other matters as may prove of interest in the study of military medicine and surgery." The response to this circular was immediate and gratifying. From the large general hospitals and from the battle-fields, as well as from private sources, came extensive contributions to this enterprise, so that a catalogue, printed in 1866, showed a collection of 7716 specimens of all kinds. To the administrative ability and personal interest of Surgeon-General J. K. Barnes we are indebted for the successful establishment of this museum on a permanent basis. Succeeding surgeons-general have manifested similar interest in perpetuating and fostering its growth.

To Drs. John H. Brinton, J. J. Woodward, George A. Otis, J. S. Billings, and others are due its scientific value and importance, each of these gentlemen having given time, care, and learning in building it up to its present condition.

On the completion of the new library and museum building, this collection was transferred from the old Ford's Theater building, with the library, to its present spacious and secure quarters.

At the present time the collection contains over 33,702 specimens of all kinds, which may be divided as follows:

Pathological, 12,164; human anatomy (normal), 4470; comparative anatomy, 1717; microscopical specimens, 12,457; medals, 1205; instruments and apparatus, 1044; microscopes (showing evolution of the instrument), 188; miscellaneous, 457.

The annual addition of specimens in all the above lines is large and constantly increasing.

Connected with the museum are extensive pathological and bacteriological laboratories, which serve as important feeders to the main collection.

It would be useless and tedious to enter upon a detailed description of this collection ; it must suffice to say that as a storehouse of the results of military medicine and surgery of thirty years ago it is probably the most unique and valuable collection in the world, affording a curious and interesting comparative study of methods and treatment of that period with the advanced views and practice of to-day.

But this museum is not solely a receptacle for the results of the work of the past ; it has kept well abreast of the times, and presents in its later accumulation the evidences of the advance of scientific medicine and surgery. Departing from its original limitation to military medicine and surgery, our museum has greatly extended its scope, and now includes the departments of human anatomy and osteology, physiology, embryology, pathology, and anthropology, with illustrations of the methods of research connected with all the branches of practical medicine.

As will be seen by referring to the classification of specimens, we have made the largest use of photography and micro-photography in illustrating tissues and structures of the human body. Within our miscellaneous department are included models for the study of veterinary medicine and surgery, and some space is devoted to prosthetic apparatus, and to instruments and appliances used in the several departments of medicine and surgery ; in fact, we desire by this museum to effect through object teaching that which is secured in the library by written works and treatises, viz, a thorough illustration of the science of medicine as it is found at the present day.

In this very brief description of the museum and its scope I have hardly done more than give to it a "certificate of character," for I feel that I must not encroach too much upon the time which has been so kindly allotted to me, and I now desire to come to the point of what I have to say relative to dentistry.

Our museum is not so well furnished with material relating to your profession as is our library. The collection of books and journals is a part of the library management, and it is our care to see that the several departments of medicine are well and harmoniously rounded out.

Books and journals we can obtain by purchase ; specimens pertaining to your daily work, illustrative of normal and morbid dentition, and of diseases of the oral cavity, we cannot make, nor can we always buy ; therefore I appeal to you, individually and collectively, to manifest not only sympathy in the proposed movement, but to give evidence of a practical interest by contributions, that we may be able to erect within our hall an exhibit of dentistry which shall be worthy of your profession.

By gifts and by limited purchases we have already what may be called a nucleus for such an exhibit. We have sufficient space and all the facilities necessary for the purpose, and all we ask is the material. Look through your private collections, and separate such specimens as, in your opinion, would be appreciated by your dental brethren if placed where they could be seen and studied. Throughout this country there must be thousands of such specimens which, if collected in one place, would form an unrivaled exhibit, to say nothing of their value as means of instruction to the student and investigator.

You may ask me what we especially desire for this exhibit? I would suggest casts, photographs, and specimens of normal, morbid, and anomalous dentition, of diseases of the maxillæ and oral cavity; photographs and casts of surgical operations, prosthetic apparatus of all kinds used in your work, new instruments, and specimens of mechanical work, and any miscellaneous material which may lend an interest to the subject of dentistry. All specimens intended for the museum should be accurately labeled and accompanied by a concise description and history of the case, when possible.

Do not be deterred from making contributions on the ground that we probably have many such specimens as the one proposed to be sent. Of all things we need duplicates, not only for inter-comparison, but for the purposes of exchange with other institutions, whereby both our own and others are benefited.

It is not necessary that you should attempt to mount your specimens; send them to us as they are, and they will be prepared and mounted by our pathologist.

Neither is it necessary that freight or express charges be prepaid; address your contributions to the Curator of the Army Medical Museum, Washington, D. C., and they will be received and cared for.

So soon as the number of contributions relating to the subject of dentistry will warrant, it is the intention of the management of the Museum to collect them together into one department where they can be exhibited and studied to the best advantage; it is also proposed to appropriate a certain amount annually for the purchase of models, preparations, and appliances pertaining to dentistry.

In common with medicine and surgery and their collateral branches, dentistry has made great strides of advancement during the last quarter-century. Your methods of instruction and training have constantly improved; your text-books and treatises are becoming fuller and more complete; your journal literature abounds in thoughtful, live articles, showing a just appreciation of the demands of the age, as well as of the necessity for basing the superstructure of your specialty on the broad foundation of a thorough knowledge of general anatomy, physiology, and pathology: your professional future promises still greater advance and progress.

Now, in what way can our Museum contribute to your professional benefit? I would answer that such a collection is an educator; a means for the diffusion of useful special knowledge. Within our walls you will find a record of what has been done and what is being done. It is the function of the Museum to preserve this record for all time. By the study of its collection you will be enabled to make comparison of the methods of practice and the modes of thought of your professional co-workers; to enlarge your knowledge of normal and abnormal and anomalous development; to study pathology in forms which may not have previously met your eye; finally, to enlarge generally your powers of observation and widen your views.

It has been a fundamental idea in the origin and development of this Museum, and especially with my predecessor, Dr. Billings, that this collection should be not merely a repository of the curious and interesting in medical science, but also a school for the demonstration of methods of research for the benefit of investigators and teachers.

It is for this purpose that I ask your interest and action in carrying out the spirit and intent of the resolution of the American Dental Association, by assisting us to build up a creditable exhibit of your specialty, which in time shall be an important and invaluable aid to your students and practitioners.

As I have before said, you shall have the cordial co-operation of our management in making this department equal to any other of the Museum; and, in closing, I heartily invite you, during your session in this city, to visit both the Library and the Museum, and see for yourselves what can be but imperfectly described in so limited a time.

On motion of Dr. H. B. NOBLE, a vote of thanks was given Dr. Huntingdon for the information given in his address and for the invitation extended to visit the Library and Museum.

Dr. M. H. CRYER gave a lecture, illustrated by stereopticon views, upon the subject of the maxillary bones. The views shown were those shown before the American Dental Association, August, 1895 (see DENTAL COSMOS, January, 1896), with some additions, and the lecture was in the main on the same lines and much the same in substance.

Dr. H. C. THOMPSON read the following report:

Mr. President, and Gentlemen of the Maryland and District of Columbia Dental Society: On behalf of the Committee on Anatomy, I would respectfully report as follows:

Your committee recognize that in this branch of its labor very little can be brought out that may be considered as new; the study of anatomy being a field that during the last decade has been gone over by scientific students very thoroughly. Indeed, I might say that general anatomy has reached the exhausted period when, according to our present light, very little can be added, although recent developments have shown that we have long labored under errors to a degree.

Recognizing such to be the case, your committee has turned its attention more especially to special or regional anatomy as being a field of research, the results of which would have a greater bearing on the specialty of dental and oral surgery. Almost all writers on general anatomy, in their descriptions of the osseous structures, except in a brief manner, confine themselves to external surfaces and shapes of bones and their relations to other parts. That this is a necessity, I think no one will dispute; but as the dentist in the prosecution of the calling of pathologist cannot afford to be contented with this, he must, if he would intelligently combat the various diseases of the bony structures that are in direct relation to the teeth, have an intimate knowledge of the internal structure, the variations of the relationship by normal and abnormal changes, and a knowledge of how to meet and take advantage of these various changes.

I might, if it were practical to do so, consume much of the time of this meeting by going into these relationships and their changes extensively; but your committee has seen best to confine itself to the more salient points of the interesting and instructive paper and lecture of Dr. Cryer, which has given us much enlightenment on the subject of regional anatomy.

In his experiments the doctor has, by making a series of sections in various directions through the jaws, given views of the pulp-canals, their sizes and directions, the various cavities of the bony structures, bringing out clearly their size, form, and what is more especially important, the variations of the size and form of the antrum and other cavities of the head. Thus, in some of the sections, it will be seen that the antrum of Highmore describes the figure of the inverted cone (as given in the text-books), while in other specimens are seen septa formed by projections of the roots of the molars into the antral space. Again, he has shown that in some specimens the most dependent portion of the antral floor (as given by our anatomists) lies over the anterior root of the first permanent molar and the second bicuspid root, while in others, especially where the aforesaid septa exist, there are two points of dependent portions; thus accounting for the causes of some of our failures in the treatment of antral diseases. This is especially patent when we see that the lowest point of the antral floor may be over the dens sapientia.

Another very important point brought out by Dr. Cryer is that of the changes of the form of the antrum by extraction, viz: that even where there exist bony ridges on the floor of this cavity, absorption may level them; also that the post-dental nerve, which supplies the posterior teeth, instead of passing down the interior of the bony structure follows a groove along the posterior wall of the antrum.

To follow out this line of study, your committee has made investigation of a series of skulls with the object of determining some of the relative changes that go on in the body of the superior maxilla and the antrum after extraction, and from these deducing landmarks whereby the most dependent portion of the antrum, when normally formed, may be determined in the edentulous jaw after absorption of the alveolus.

From these examinations it deduces the following: that if two imaginary lines be drawn inferiorly, one along the posterior parietes of the canine fossa, another along the anterior face of the zygomatic fossa, the convergence of these two lines will, in the majority of skulls, be almost directly over the lowest point of the antral floor.

Your committee also finds much of interest in the sections Dr. Cryer has made of the lower jaw. One of the most interesting is the way he has demonstrated the course of the inferior dental canal, of which the text-books give very little information, and that erroneous in part. By these sections he has demonstrated that the canal after passing the mental foramen is bent on itself, becoming recurrent before it makes its exit. This he attributes to the fact that as each successive tooth is developed, there is a pushing forward of the canal by the cancellated tissue to which this canal is attached. Again, in relation to the superior maxilla, the doctor has newly described the form of the infra-orbital canal, leading from the infra-orbital foramen to the floor of the orbit; in effect that this canal does not pass through solid bone as described by anatomists, but passes through a bony tube through the sinus, having a mucous covering.

Another interesting point brought out by this lecture lies in the exhibition of the difference in the development of two segments of a lower jaw ; one segment in cross-section showing cancellated tissue in a normal state, while in the other it has become dense to the degree of almost obliterating the inferior dental canal.

This difference he very logically attributes to the fact that on the side where the greater density exists, the teeth being in a diseased state, the vascular excitement having caused increased activity of the osteoblasts, the results were almost an obliteration of the cancellous tissue.

Especial attention should be called to the original manner in which Dr. Cryer has reached these important discoveries : First, by sections through the skull at different points, and cross-sections of the same, thus giving literally views of conditions as they exist.

Secondly, by means of impressions in fusible metal flowed into the canals, after which the bony tissues are dissolved away, leaving an exact counterpart of such canals and cavities. These original lines of experiment open up to the student of osteology large fields for investigation of the bony structures, by which he may learn very minutely the changes and relationship of the cancellous and compact tissues, as well as the causes of such changes.

Finally, it places before the profession a series of important scientific facts which have heretofore been speculative, and in many respects erroneous.

Your committee, in closing this brief report, would congratulate the profession on the fact that it has had such important facts presented for study by a gentleman who is the pioneer in this line of experimentation, developing as he is a vast mine of knowledge, the advantage of which neither the dental nor general surgeon can now estimate.

Discussion.

Dr. W. A. Mills said when he was a younger practitioner he used to hear much of a disease called ganglionosis, where an abscess formed under the deciduous tooth and destroyed the permanent tooth beneath it. In some cases there would be merely the cap of the permanent tooth left when the deciduous tooth came away. He asked whether such an abscess forming as described would so destroy the permanent tooth.

Dr. Cryer thought perhaps it would. The diseased condition of the deciduous tooth would interfere with the membranum intermedium and destroy the permanent tooth, and whatever of enamel was already formed would be likely to come away. He prefers to teach that forceps should not be used when extracting deciduous molars, because the permanent teeth extend up between the roots of the deciduous teeth, and if the latter are extracted there is not only the danger of dislodging the permanent tooth, but the extraction of the deciduous teeth will interfere with the development of the jaw, and cause the permanent molars to come in irregularly.

Dr. C. C. Harris said there was one condition that sometimes occurs in a tooth which is seldom heard of, but may cause serious trouble ; that is, where living nerve and blood-vessels in one root of a tooth are shut off by dead nerve and blood-vessels in another root.

In such a case the trouble may only with difficulty be discovered. The cause might arise from osteitis, pulp-stone, or strangulation. He described a case, a lady who suffered severely from neuralgia, and who was under his care and receiving attention from a physician at the same time for several months. He had filled a molar through an anterior cavity without suspecting the condition. Another patient had a molar with a cavity on the posterior side, and the posterior root with the pulp dead and foul, but upon examination the anterior root was found in a healthy condition. This opened his eyes to the possibility of the other case being of the same nature. Upon examining the tooth, he found the posterior root filled with a dead pulp, but the anterior pulp was alive. He killed this pulp, treated the root, and the neuralgia was cured. He spoke of other cases of the same character in his practice.

Dr. C. R. Diffenderfer spoke of cases somewhat similar in his own practice.

Dr. Harris described the case of a patient who had applied to him for treatment, suffering with nasal catarrh. Upon examining the teeth, the right superior third molar was found to be sore. This tooth was extracted, and immediately there was a great flow of pus from the antrum. This showed that even the third molar may in some cases cause antral trouble.

Dr. Thompson described a case in which there was an evacuation of pus into the mouth opposite the second molar. It was almost impossible to make an examination on account of the inflammation and exfoliation, but at length it was discovered that there had been an application of arsenical paste in the third molar, and this had caused periostitis. The patient was ordered to take a course of brewer's yeast, and in a month he had gained nineteen pounds in weight, and the flow of pus had nearly ceased. In six weeks he was able to open the mouth and extracted the tooth.

Dr. Emory A. Bryant described a case of a woman who had become nearly blind and suffered terribly with neuralgia. Upon examination of her mouth, he discovered two impacted teeth. Upon extraction of these, the neuralgia ceased and the sight was much improved. Another case of his was a lady who for ten or twelve years had suffered from neuralgia. The teeth showed no signs of decay except one molar. This was found to be too sensitive to allow of its being filled. He extracted it, and on examination he found the pulp in a watery state. He extracted another tooth and found it in the same condition, with a secondary deposit of dentine, and proceeded to extract all but the anterior teeth, and all were in the same condition. The patient was provided with artificial teeth, and had no further trouble with the neuralgia.

Dr. Williams Donnally thanked Dr. Cryer for his address, and regretted that his knowledge of the bones of the face was not sufficiently exact to enable him to appreciate the subject as he thought every dentist should. One or two of the plates, he said, showed a very thin covering of the sinus. This called to his mind a case he had had. A physician sent him the patient, who had a discharge from one side of the nose. She was forty-five or fifty years of age, and had been wearing a full set of upper and lower artificial teeth for several years. The mouth seemed to be in a normal condition for one who had been wearing artificial teeth so long, but upon passing his finger over the site of the first bicuspid a small projection was discovered, which moved when touched with an instrument. He removed this with an excavator, and found it to be a very small piece of the root of the tooth. The walls of the antrum were so very thin that they gave out a crackling sound upon pressure. Another case he described as showing that when an artificial opening into the antrum is made, it may be safe to allow it to close before the natural opening is open for the outflow of the secretions. In this case he kept the artificial opening open for several months, believing that the mucous lining could never return to the normal condition and carry off the secretions in the normal way. He had made a projection on the plate to cover up the hole, and after a while cut the projection off and tried to heal up the opening. The patient was called away from the city, and, returning in about two months, the artificial opening was found to be quite healed up, and the normal one in a natural condition. He stated this case to show the possibility of the normal opening becoming natural again, though the closure had been complete.

Dr. E. P. KEECH described the case of a lady of eighty years of age, who had been sent him by a physician for diagnosis. On the left side of her face was a tumor, and on the floor of the palate another about as big as a small hickory-nut. She informed him that some time before the lateral incisor had dropped out. The only tooth left was the left central and a small cuspid root. He found that a probe could be passed into the antrum through the left lateral incisor space, and having extracted the cuspid root, an opening was found here also into the antrum. He treated with peroxid of hydrogen and got a good flow of pus, but still the external tumor pointed, and he had to lance it. Considerable pus came from this, but he finally got it cured. The tumor on the floor of the palate was reduced to the size of a pea, but he had to lance it and got more pus. His diagnosis is necrosis, and he is puzzled to know what to do with it on account of the great age of the patient. If she were younger, he would administer a general anesthetic and clean out the necrosed bone, but hesitates on account of her advanced age. Has treated it with aromatic sulfuric acid. He asked Dr. Cryer for a suggestion.

Dr. CRYER said he had a case in Washington of a similar kind eighty-five years of age, and he was hesitating as to whether he should operate, but if other treatment will not effect a cure the parts will have to be opened up and the carious bone removed. When this operation was performed from the outside it was a serious one, but now it can be done from inside the mouth by the aid of the surgical engine, and it is much safer.

In regard to the case mentioned by Dr. Donnally, the opening into the nose had probably been restored before the artificial opening had been closed. In case the natural opening was free he always preferred to get the artificial one healed up, but if the natural one was closed he inserted a canula in the artificial one to keep it open for the necessary drainage.

The subject was closed, and remarks were invited upon the subject of the address of Dr. Huntingdon.

Dr. W. W. Dunbracco said every dentist should feel it a duty and take pride in doing all in his power to uphold, to upbuild, and increase the usefulness of the Library and Museum. There were specimens of pathological teeth and other valuable abnormalities coming from day to day into the possession of dentists, which, if they were sent to the Museum, would be cared for, and be a means of education for all future time. He hoped each one present would make such contributions when possible.

Dr. H. B. Noble was surprised that dentists, and more especially those who lived in Washington and its vicinity, took so little interest in the Library and Museum. The subject would be brought before the American Dental Association at Saratoga this summer, and should be brought before every dental society in the United States, to impress all dentists with the desirability of depositing rare and unusual teeth, casts of peculiar mouths, etc., in this museum, where they will be carefully preserved and exhibited.

Dr. J. B. Rich thought the subject of such great importance that, in order to present it before the societies of the whole land, he would move that a committee be appointed by the chair for the purpose of keeping this subject before all dental societies in the United States, and impressing the members of said societies with the necessity and the benefit to the profession of enriching this dental museum. The War of the Rebellion gave the Museum a collection of vast value to the physician and surgeon, but the dental branch needed material badly, though it was extensive even now.

Dr. Rich's motion was opposed on the ground that the American Dental Association already had a committee on the same work, with its chairman a resident of Washington, and the motion was withdrawn.

Convention adjourned till 9 o'clock next morning.

(To be continued.)

DENTAL SOCIETY OF THE STATE OF NEW YORK.

The twenty-eighth annual meeting held at Albany, May 13, 14, 1896.

The annual address was read by the president, Dr. H. J. Burkhart, of Batavia, who feelingly called attention to the losses by death of members which the society had sustained since its previous meeting. Dr. Edwin C. Baxter, of Albany, and Dr. W. H. Dwinelle, of New York, whose decease had deprived the society of their helpful influence, were the subjects of eulogy, and their example of earnest professional endeavor commended.

The address dealt largely with the changes which the recent new dental law of the state had effected, and their influence on the conduct of the society's affairs through abolishing the Board of Censors. The claims of the Dental Protective Association upon the allegiance of all dentists were strongly urged, after which a number of suggestions were made respecting the internal economy of the society.

Dr. R. Ottolengui then read the

REPORT OF THE CORRESPONDENT.

Mr. President and members of the State Society :

It is the duty of your correspondent to gather the opinions of practicing dentists upon some matter of interest to the profession at large, and to report at this meeting. This year it occurred to me that, whereas American dentistry claims ascendency over the practice in other parts of the world, there is one method upon which we might receive information, if not instruction, from our brothers across the water.

In this country we have educated our patients to the point where they no longer look upon gold, in the front of the mouth, as a disfigurement, but either as a necessary evil, bearable because all others endure the same infliction, or in many cases as a positive adornment. In this latter respect I regret to say that many unscrupulous men unhesitatingly crown incisor teeth with solid gold crowns, telling confiding and vain patients that it is the fashion ; or in some instances they have even placed gold crowns in which they have inserted flashing diamonds, so that what was once looked upon as a myth in dental practice is now at last a common sight in the metropolis. I recently saw a woman (evidently not a lady), in whose mouth four gold crowns conspicuously showed, two of which were set with diamonds. This is a practice as degrading to the science of dentistry as it is meretricious on the part of the patients.

In Europe a contrary state of affairs exists. The plastic fillings are more in vogue than gold, and hence the dentists of Europe have continued to seek a solution of the porcelain-filling problem, even though such a method could not promise so much as gold. They hoped to do better with it than with phosphate or gutta-percha alone.

Recently I have been led to believe that the Europeans have brought this practice to a high state of perfection, and therefore I essayed to obtain a report of the status of that method of practice.

I addressed the following letter to twenty-five leading practitioners, a few of whom have obligingly replied :

> "As Correspondent of our State Society, it becomes my duty to report each year upon some important advance in dental science. I have learned that porcelain fillings are much more in vogue on your side of the water than in this country, and therefore I have decided, this year, to ask the leading men among our European *confrères* for an expression of opinion upon this subject. Will you let me have a statement of the results of your experience with porcelain as a filling-material? And will you cover the following points?
>
> "What is your method? To what class of cavities do you limit its use? What cement do you use? How long do the fillings remain in position? Is it a satisfactory substitute for gold, aside from esthetic considerations?"

Dr. Wm. Slocum Davenport, 30 Avenue de l'Opera, Paris, sends the following :

> "I have found where it is possible to secure an accurate impression of a cavity, that the operation can be made a perfect success, and is a satisfactory substitute for gold aside from esthetic considerations. For large cavities, soft and frail teeth, and for nervous or elderly patients, it is especially useful.
>
> "The impression is obtained by pressing No. 40 crystal (rolled ?) gold into the cavity with small pieces of amadou. The gold is burnished to the cavity, and over its extreme edge. It is then removed by inserting a sharp explorer point into gold at the bottom of the cavity and lifting gently (should the gold

be punctured it is immaterial), and invested in a paste of powdered asbestos and water.

"With the impression in this position we remove excess of water with blotting-paper, and are then able to fill it about half full of the glass material and bake at once under flame of the blow-pipe, in Cunningham, Downie's, or any other furnace. Two or three bakings are usually necessary Cooling after baking is obtained in a few seconds by placing the bottom of the spoon in a few drops of water. The investing and baking require but a few minutes. Try the filling in the cavity first with the gold intact. If necessary, grind off excess of contour and burnish gold at the edge of the filling, which will at the same time break all feather edges from the filling.

"Remove, invest, and heat until the surface takes a polish. This is very important.

"In building up cusps or contour surfaces cover the portion of the filling which is not to be changed with investing material, then add porcelain as desired.

"The success in this artistic branch of dentistry is in proportion to the perfection of the operation. Fillings which I finished accurately about four years ago are still in every way good. When I relied on cement for badly fitting fillings black and rough edges have resulted, and fillings which required grinding and polishing after cementing have turned dark gray and sometimes nearly black.

"F. Meyer's glass preparation is far superior to any I have used. It flows to the surface of the gold as though it were solder. It makes a hard filling which has a surface like that of an English tooth. Materials made by Cunningham's, Downie's, and Reisert's, also Allan's gum enamel, are most valuable in producing gum color, green-stain, or tobacco teeth. George Poulson's plumbago granite cement is no doubt very good for setting inlays, but undercuts in cavities and grooves in the filling are very necessary. Porcelain filling occupies a position apart, which no other material can fill."

Dr. Isaac B. Davenport writes as follows :

"Obtain an accurate impression of the cavity, No. 40 gold foil, extending the gold over the edge as a guide to contour. Place a portion of the material in the impression, and fuse over the spirit lamp or Bunsen burner. If there is any doubt of the perfection of the impression, try it in with first layer of fused porcelain ; and if it rocks in the cavity, the porcelain is broken down and the gold pressed against the wall. Remove, add new material, and fuse again. This method of repeated fusing overcomes the effects of contraction.

"When the filling is perfect in color and form, the gold is peeled off, retention grooves cut with a diamond disk, and it is ready to be set with any cement suitable for setting crowns. The cement should approach the color of the inlay.

"In large or difficult fillings I employ the method described by Dr. W. S. Davenport, investing in the powdered asbestos and water.

"The filling should fit perfectly without grinding. I always fear that a ground surface will absorb organic matter and become discolored.

"The fusing should be perfect each time, but overheating destroys the color. I usually select a shade darker than seems necessary.

"I have fillings which have stood six to eight years ; but in some mouths the thin line of cement dissolves out in a year or two and needs replacing. A well-fitted porcelain filling set in cement will last much longer than a cement filling in the same mouth.

"I prefer porcelain to gold almost solely for esthetic reasons, and only use it on visible surfaces. I am not convinced that it is a fit material for large compound cavities in bicuspids or molars, unless perhaps in a tooth standing alone.

"Latterly I have set inlays with gutta-percha, and am inclined to think this may prove better than cement."

Dr. A. V. Elliot, 10 Via Tornabuoni, Florence, Italy, sends the following :

"After several years' experience I find that for certain cavities this method is eminently satisfactory, especially where the appearance of gold would be unsightly.

"I prepare the cavities as for gold, then fill the undercuts with wax to facilitate the removal of the matrix.

"I use Myer's prepared powder, and form the matrix with No. 60 or 80 gold foil, or gold and platinum, the gold being on one side and platinum on the other. The gold is pressed into the cavity with a small stiff wad of cotton and afterward burnished. I use Harvard cement, because of its adhesive and other good qualities.

"Though not as permanent as gold, porcelain fillings are more durable than either white fillings or gutta-percha alone, and certainly far more artistic.

"It must be remembered, also, that the ladies of this country, not having reached so high a degree of barbaric civilization as the Americans, are unwilling to have gold pounded into their teeth where it can be seen. Hence, under the law of least resistance, we are under a greater necessity to disguise our work."

Dr. Charles J. Monk, 12 Wilhelmstrasse, Wiesbaden, Germany, writes as follows :

"From my own experience and that of my colleagues whose work I have seen, I am satisfied that porcelain fillings should have a place in the repertoire of every dentist. Where the porcelain is accurately adapted, these fillings I think must be as durable as gold.

"My method is as follows : I obtain the small buttons of porcelain which Ash & Sons supply in various forms and shades, fit as well as possible, and set with carbon cement mixed thin, grinding and polishing the next day.

"The durability of porcelain fillings depends upon the close joint obtained, so that little or no cement is exposed.

"In the three years during which I have done this work, I have had none come out except in approximal cavities where the facing is porcelain and the lingual surface cement. With these several cases the cement has washed away, porcelain remaining in position, and I have simply added more cement."

Dr. Waldo E. Royce, 2 Lonsdale Gardens, Tunbridge Wells, England, sends me the following :

"English patients strongly object to conspicuous gold fillings. The dental profession has therefore been forced to look for some substitute possibly less durable but more esthetic. Of all these substitutes, whether considered from the point of durability or appearance, I am convinced that porcelain stands first.

"My first operations of this kind were performed about fourteen years ago. I then ground pieces of Ash's teeth to fit the cavity. These operations have proven most satisfactory both to patient and operator, but the time consumed and the consequent fee placed them beyond the reach of most patients. Mr. Dall, of Glasgow, has amplified this method, and at the last meeting of the American Dental Society of Europe showed some very beautiful specimens.

"I next used Richard's glass fillings, and for small cavities I find them reliable. I have made dozens of them, and it takes a sharp eye to detect some that have already stood for about five years. In the mouths of my patients small glass fillings do not change color. I have not been so successful with large ones. I set with Harvard cement, the rough surface of the glass giving a particularly strong hold.

"The cement should also be of a color to match the tooth, and the filling covered like a cement filling with sticky wax. These fillings can be made without leaving the chair, and in less time than is usually required for a gold filling.

"Of the porcelains, I have attained the best results with a body which comes from Dresden. It is worked very much like the glass, but it requires such a high temperature to fuse it that we are instructed to invest the matrix in powdered asbestos, holding in a platinum spoon and fusing with a blowpipe.

"This method I have found very uncertain on account of the danger of smoking the inlay. I have of late used Downie's furnace with good results. Much should be done by the manufacturers of all these bodies in the way of improving the shades. It is absolutely necessary both for appearance and durability that the porcelain should perfectly fit the cavity. It should therefore only be used in cavities which are easy of access. For such cavities I think it is the coming material, but with our present knowledge of its manipulations it should not be used as a substitute for gold except where its esthetic qualities are essential."

Dr. A. T. Webb, 87 Via Nazionale, Rome, Italy, writes as follows:

"I have been using porcelain for inlays and fillings during a period of about four years; at first grinding in pieces, and later adopting the system of burnishing platinum foil to the cavity and building up with bodies. Naturally at first I confined such work to the anterior teeth and buccal surfaces, with considerable satisfaction; but later, with the confidence engendered by closer adaptation, I extended it to include all classes of cavities, and with results which have exceeded my anticipations.

"I have used it in all classes of teeth, both from esthetic and conservative principles. In cases where the showing of gold was unavoidable, in the anterior approximal cavities of the upper bicuspids, I have used the porcelain with so far good results. Some which I did two and a half years ago are in excellent condition, and bid fair to endure for several years. In those teeth where the plastics are strongly indicated, I have found the porcelain of considerable value. By its use the life of an ordinary cement filling is much prolonged

"From my own experience, and observation of the work done by colleagues, I should say that three years would be a fair average of durability. As to being a satisfactory substitute for gold in select cases, Yes. But for all-around use gold must be awarded the premium as heretofore."

Dr. E. A. Galbreath, Hanover, writes as follows:

"I include under the head of porcelain fillings also those made of glass. I use them only where esthetically anything else would be impossible, as in incisors, cuspids, etc. For restoring corners I use glass, fusing in the well-known way on platinum-gold foil. For cavities not extending as far as the cutting-edge I use Ash's right and left porcelain rods. They give me great satisfaction. I grind them in,—they fit fairly well already,—cut them off, set in cement, and then polish. I use Poulson's cement.

"Small glass contour fillings I re-set every two years. The cement should be mixed very thin, or the block breaks in setting. Large blocks hold much longer, because the cement can be mixed harder. Of course all cements dissolve, other things being equal, according to the amount of powder incorporated with the crystals (liquid). The durability of porcelain fillings is limited by the durability of the very perishable cement with which they are set, so that in this respect there is no comparison between them and gold fillings. They give, however, my patients and myself so much satisfaction that I am using them more all the time."

Dr. Wilhelm Sachs, Tayentzienstrasse 3a, Breslau, writes as follows:

"I prepare the cavity, leaving sharp edges and no undercuts. I then take an impression of the cavity with Stent's impression material, and make a model with cement filling-material. After hardening, I grind a piece of artificial tooth, or, better, a porcelain inlay from S. S. White, suitable in shade, to fit the cavity of the cement model, grinding it a little conical until it will go about half-way into the cavity. I then fasten the porcelain piece with shellac to an old broken excavator, and fit it as exactly as possible into the cavity of the tooth.

"I use porcelain for labial surfaces of incisors, cuspids, and first bicuspids; occasionally for mesial surfaces of second bicuspids if first bicuspid is lost. I never use it for restoring a corner of incisors or cuspids when the pulp is alive. I have had many such failures, although in some cases corners will stand for more than ten years. But these are exceptions. When the pulp is dead, I restore the lost corner by taking an artificial tooth, soldering a gold post to the pins, and fitting it to the tooth.

"I use Weston's cement, mixed thin; sometimes Poulson's cement; but this, although it adheres very well to the walls of the cavity, is too sticky, and if not mixed very thin it does not harden thoroughly.

"After porcelain is inserted I leave the dam in place for some time, but grind and polish next day. If you attempt it in the same sitting, often the porcelain will jump out.

"I have a large number of porcelain inlays which have stood now over ten years; but in all cases the porcelain must be surrounded by tooth-substance.

"Porcelain fillings in the right place are a very satisfactory substitute for gold; for esthetic purposes porcelain is the best of all filling-materials.

"I use glass fillings sometimes, taking an impression of the cavity with gold-platinum foil in which I fuse the inlay.

"The glass filling must never extend over the edge of the cavity. If you grind surplus off, you get a porous substance which will discolor in some mouths. Glass fillings are very satisfactory, if you make them so perfectly that the upper glossy surface is just level with the tooth surface, so that no grinding at all is required. If the glass filling is properly done, it will stand a long time. I have about twenty cases which I have watched for about seven years, and they are in good order. The glass filling must be fastened with very thin Weston's cement.

"I do not think glass and porcelain fillings are used more extensively in Germany than in America. Only few first-class dentists will take the trouble to make glass or porcelain fillings, as the time required for it is about four or five times as great as for a gold filling."

Dr. William Mitchell, 39 Upper Brook street, London, W., England, writes as follows:

"Personally I have had comparatively but little experience in that class of operations, for the reason that it has not appealed to me as a reasonably perfect operation in the majority of cases where undertaken; this conclusion being arrived at from personal experience, but more especially from observations of operations of others who demonstrated by their attempts that they had had considerable practical experience with line of operations.

"As a rule, I have found the inlay method the most successful in my hands, —*i.e.*, selecting a piece of porcelain of the desired shade and grinding this to shape; this, when set in position, can be contoured and finished flush with the tooth, and given the requisite degree of polish. In this connection I would say English teeth are the best adapted to this class of work, owing to their uniformity of texture and the way they can be polished after the vitreous surface is removed I would like to mention here the enamel-rods of various shades and sizes devised and prepared under the instructions of Mr. Dall, of Glasgow, who has devoted a great deal of time and personal effort to perfect a system for this kind of work, and who deserves the heartiest thanks from our profession for his untiring energy in this direction.

"Porcelain fillings I have done but little with, and the results in my hands as to shades and shapes leave much to be desired. While it is possible to approximate the desired color, the least fluctuation of heat will spoil an otherwise fair operation. I say fair advisedly, for I have but rarely seen a good one,—*i.e.*, one that I would wish in my own mouth or consider a specimen operation, considered in all its points as compared with a gold filling.

"This has special reference to porcelain fillings as distinguished from inlays. The class of cavities to which I have confined my efforts are erosions, abrasions, and carious cavities upon the labial surfaces of the anterior teeth. The operation as to the two former is practically alike. The cavity is prepared very much the same as for a gold filling, except that the margins are left as nearly perpendicular as possible,—*i.e.*, at right angles to the floor of the cavity, instead of beveled as in a gold filling. The piece of porcelain is then ground to fit. This requires an amount of precision rarely given to this operation, for upon the degree of approximation depends the result. The eroded or abraded cavities are irregular in shape, and frequently require much time in the operation of restoring lost tissue, but the results will repay all time and care bestowed in this direction.

"A method used by my brother, Dr. L. J. Mitchell, possesses many advantages, although the operation involves much time and considerable capacity to produce the best results. The process is as follows: given a case where the loss of tissue involves nearly the whole face of a tooth, the edges are to be as well defined as possible; the incisive of the cavity is to be undercut by running an inverted cone bur transversely in the cavity, while the cervical portion is to be prepared as for a gold filling. The piece of porcelain is then fitted with the incisive end beveled to fit in the undercut, while the cervical portion is beveled in like manner. After the filling is perfected, and after applying the rubber-dam, the piece of porcelain is cemented in place. After the cement has become perfectly hard, that along the cervical margin is cut away from the retaining groove, as well as any that may be along the cervical bevel of the piece of porcelain. The retaining groove is then filled with gold, which is carried over the bevel on the porcelain; the whole is then harmoniously contoured to the required shape and polished. The inlay is then held in place most effectually, and an extremely neat operation is the result.

"When a very thin piece of porcelain is used and cement alone depended upon for its retention, it is very prone to loosen, owing to the porosity of the porcelain being accentuated through hardening the vitreous surface removed in its preparation, or its subsequent grinding down when *in situ*. This permits of the oral fluids penetrating it, and disintegrates its union with the cement, which eventuates in the early failure of most of this work. When possible, as in the case of caries on the labial surfaces of the teeth, the cavity is made circular, the piece of porcelain is mounted with shellac, or preferably sealing wax, upon one of the metal mandrels suggested by me some years ago (and now obtained at any dental depot). This after close approximation upon a diamond disk, the mandrel being run in the engine; the piece of porcelain can then be ground into the cavity by the aid of very fine pumice powder and water. This will make an inlay necessitating the minimum amount of cement, which is a benefit in all cases, as I believe the less cement required the better the operation and the probability of results. Where possible, retaining grooves should be cut along or around the inlay a short distance from the surface. This may be easily done with a diamond disk. This facilitates the adhesion of the cement. I have set a few inlays with gutta-percha, Hill's stopping and Jacobs's gutta-percha being about equally used; the latter seems to be the most satisfactory. Any fine-grained, quick-setting cement will do for this work, provided the shade approximates as near as possible the color of the natural tooth; otherwise the absence of translucency incidental to this work will be accentuated. Of the comparatively few operations I have done, I am well satisfied as to their durability; the artistic side, I think in most cases, left something to be desired. Esthetic considerations being put aside, I consider a good gold filling far and away the best thing where the patient's personal appreciation of the operation supplements hygienically the ability and devotion shown by the dentist."

Dr. Jenkins, of Dresden, writes that he believes that his most recent discoveries in connection with low-fusing porcelains bring the work to a high state of perfection, but that until he has tested some of the details of his present method a little longer he prefers not to publish. From what I have heard of the work done by Dr. Jenkins, I am satisfied that his statement is correct, and the method which I have myself followed is his method as it has been described to me.

Before giving my own views on this subject, I wish to call attention to the fact that even in Europe, where porcelain or glass fillings are more in vogue than in this country, the dentists admit that gold is a more permanent reliance, and that esthetic considerations explain the demand for the porcelain.

In my hands the method has proven neither so satisfactory nor so simple as its advocates in this country have undertaken to claim for it. While it is true that the porcelain may be fused in a few minutes, it is also true that to make a perfect filling may require an hour or more for a cavity which could readily be filled with gold in half the time. Of course, constant practice, coupled with experience, will give the practitioner an acquired skill which will enable him to fill with porcelain more rapidly than with gold, where the cavity is extensive. I will give a brief outline of the method which I have followed, and record the obstacles with which I have met.

If the process is to be limited to labial surfaces of the anterior teeth, it is evident that the demand for the filling would be comparatively infrequent. Therefore let me consider an approximal and grinding-surface cavity in the anterior of a first bicuspid. The matrix is made with No. 30 rolled gold. This is preferable to 40 or 60, because it takes a sharper impression. To obtain this mātrix is most difficult. It is very simple for the advocate of the method to say "make the matrix," and then pass on to the methods of fusing the porcelain. But the dentist will discover that many attempts to obtain a perfect matrix from an approximal cavity will prove abortive before one will be removed which is absolutely accurate, and if not absolutely accurate it is worthless. Practice has taught me that the cavity must be shaped so that, in the class of cavity which I am describing, the matrix may be withdrawn through the opening at the grinding-surface. The gold is folded in half, forming a V-shaped trough, and is passed into the cavity. Then proceed to fill the cavity with small pieces of spunk, holding the pieces in position with a small ball burnisher. No great pressure should be attempted until the cavity is practically filled, otherwise the gold will be torn, which in my experience *does* make a difference, and therefore should be avoided. The gold is burnished over the edges of the cavity with spunk, used with a wiping motion. To remove the matrix, take out all of the spunk, and then "tease" the matrix out. By this expression I mean that the matrix is to be tapped gently along the edges, and manipulated with great care until it drops out of itself. Any forcible removal will alter the shape.

The powder is mixed with water and placed into the matrix, when excess of water is extracted with bibulous paper. For the first baking fill about half full. Fuse thoroughly. Then add material, and fuse again, until the desired shape is obtained. Here occurs a step which is original with Dr. Jenkins. The filling being complete, he lays over it a bit of blown glass, and again fuses, the melted glass flowing down smoothly and forming a glazed or enamel surface of great beauty.

The main difficulty with this method is in connection with the cement. Before cement is used, the filling placed in the cavity is perfection itself, and if the color has been accurately imitated, it would be impossible for human eye to detect the outlines of the filling. But the insertion of the cement changes all this. When it is remembered how thin was the matrix, it will be recognized that no cement now on the market can be mixed thin enough to fill the space occupied by the gold, and consequently the filling is lifted from its proper position by the interposition of the cement, and an edge shows. To overcome this I have essayed the following method: After making the filling, grind away a considerable portion with a corundum, being careful not to touch the extreme edge. This makes space for the cement, and by roughening the surface of the porcelain allows the cement to stick better. Place cement in the cavity, not on the filling, and in a very small quantity. Press the filling to place, and if any cement oozes out, remove the filling, quickly cleanse the edges, and as quickly return it to place. In this manner I have inserted a few fillings which have quite satisfactory edges.

At first, as advised, I used Harvard cement, and I had great difficulty. The fluid is so thick that the mixing to a thin consistence was well-nigh impossible; moreover, the setting is so slow that the fillings would come out in a few days, undoubtedly the fluids of the mouth having disintegrated the cement before fully set.

I have fillings in, which have remained for six or eight months, and which are still doing well, which I inserted with Dawson's cement. The best cement will be that one which is of fine grain, and which sets moderately slowly. Then it is best, after setting the filling, to have the patient remain in the office, with dam in place, for half an hour or longer.

At the present stage of this process, I can recommend and even advocate it in accessible positions, where the question of time and fee are of less consideration to the patient than personal appearance. But my own experience, even with the wealthy of this country, leads me to the belief that, ordinarily, Americans will prefer gold.

In inaccessible places the gold must be our reliance, and I have little faith in porcelain for contouring corners.

HARVARD DENTAL ALUMNI ASSOCIATION.

THE silver anniversary and twenty-fifth annual banquet of the Harvard Dental Alumni Association was held at "The Thorndike," Boston, on June 22, 1896, with sixty-three members and guests present.

Reports of the secretary, treasurer, and committee on Harvard Dental School were submitted, showing the prosperity of the association.

The invited guests present were: Rev. Reuen Thomas, D.D., Brookline; Hon. Harvey N. Shepard, Boston; Rev. Willard T. Perrin, S.T.B., Boston; and Mr. John H. Colby, ex-councilman of Boston city government.

The post-prandial exercises were inaugurated by President James Shepherd, who feelingly alluded to the deaths of Professor Thomas H. Chandler, dean of the dental school, and Frederick H. Woodcock, instructor of mechanical dentistry. He then called upon the new dean, Professor Eugene H. Smith, as the first speaker. Dr. Smith, after eulogizing his predecessor and Dr. Woodcock, spoke of the requirements of the school, that greater facilities were needed for increasing the scope of its work. A new building was a necessity, now that chemistry was no longer to be taught in the medical department, and must be in the dental building; also that an endowment fund was required. The graduating class, numbering twenty-two, was the largest within its history, and though the standard yearly grows harder yet the number of students steadily increases.

The officers for the ensuing year were elected as follows: Frank Perrin, D.M.D., president; Joseph T. Paul, D.M.D., vice-president; Waldo E. Boardman, D.M.D., secretary; Washburn E. Page, D.M.D., treasurer. Waldo E. Boardman, D.M.D., chairman, William P. Cooke, D.M.D., Harry S. Parsons, M.D., D.M.D., executive committee.

The officers of the association compose the council.

WALDO E. BOARDMAN, D.M.D., *Secretary*,
184 Boylston st., Boston, Mass.

BUFFALO DENTAL ASSOCIATION.

THE Buffalo Dental Association held its thirty-second annual meeting at the International Hotel, Niagara Falls, N. Y., June 27, 1896, with twenty-five members present. The following-named officers were elected: Dr. J. K. Eckert, president; Dr. H. R. McMichael, vice-president; Dr. A. E. Mimmack, recording secretary; Dr. L. W. Robinson, corresponding secretary; Dr. S. Eschelman, treasurer.

A. E. MIMMACK, D.D.S., *Rec. Sec.*,
754 Elmwood ave., Buffalo, N. Y.

DENTAL COLLEGE COMMENCEMENTS.

BOSTON DENTAL COLLEGE.

THE twenty-ninth annual commencement exercises of the Boston Dental College were held at Berkeley Temple, Boston, Mass., on Friday evening, June 19, 1896.

The annual address was delivered by E. N. Capen, D.D., and the valedictory address by John P. Brigham, D.D.S.

The number of matriculates for the session was one hundred and eighty-nine.

The degree of D.D.S. was conferred on the following graduates by I. J. Wetherbee, D.D.S., president of the college:

NAME.	STATE OR COUNTRY.
Mary E. Alleyne	Pr. Edward's Isl'd.
Jos. L. Bellefleur	Massachusetts.
John M. Bellows	Massachusetts.
John P. Brigham	Vermont.
Edward J. Cowell	Massachusetts.
George W. Day	Massachusetts.
James W. Devlin	Massachusetts.
Albert J. Duffy	New Hampshire.
John H. Eaton	Massachusetts.
Dana J. Edmonds	New Hampshire.
Chas. F. Erickson	Connecticut.
Edmond F. Flynn	Massachusetts.
Joseph M. Gaffey	Massachusetts.
B. C. Gilbert	Massachusetts.
Frank L. Gower	Massachusetts.
Arthur W. Green	Massachusetts.
W. H. Harrington	Rhode Island.
W. E. Hanson	Massachusetts.
Francis P. Harris	Massachusetts.
George O. Irish	Massachusetts.
Charles T. Kinsman	Vermont.
Wm. H. Langdon	Massachusetts.
John R. MacKinnon	Nova Scotia.
D. L. Manchester	Massachusetts.
Chas. E. M'Intire	Massachusetts.
George M. Mayers	Massachusetts.
Edw. G. Marshman	Connecticut.
Franklin L. Mears	Massachusetts.
Stanley C. Neales	New Brunswick.
Etta May Ober	New Hampshire.
S. E. O'Donnell	Massachusetts.
Danzy R. Povey	Massachusetts.
John F. Riley	Massachusetts.
Frank B. Sharpe	New Brunswick.
George W. Soule	Maine.
Walter E. Tuttle	Maine.
J. A. L. Von Betzen	Nova Scotia.

HARVARD UNIVERSITY—DENTAL DEPARTMENT.

THE annual commencement exercises of the Dental Department of Harvard University were held, in conjunction with the exercises of the college and other departments, in Sander's Theater, Cambridge, Mass., on Wednesday, June 24, 1896, at 10 o'clock A.M.

The number of matriculates was one hundred and three.

The degree of Doctor of Dental Medicine was conferred by President Eliot on the following candidates:

NAME.	STATE OR COUNTRY.
F. H. Barnard, Jr.	Minnesota.
E. C. Bienemann	England.
A. H. St. C. Chase	Massachusetts.
Ernest H. Chute	Massachusetts.
Charles W. Crane	Massachusetts.
Harold De W. Cross	New Hampshire.
John W. Emery	Massachusetts.
E. L. Farrington	Massachusetts.
Adelbert Fernald	New Hampshire.
Guy W. Gilbert	Massachusetts.
Harry S. Gilman	Massachusetts.
Harry M. Haley	Massachusetts.
Harvey W. Hardy	Massachusetts.
Harry M. Haynes	Maine.
Robert J. McMeekin	Massachusetts.
James F. Martin	Massachusetts.
E. W. Matthews	Massachusetts.
Charles E. Monroe	Massachusetts.
Thomas K. Ross	Massachusetts.
P. J. A. Stadelmann	Germany.
Walter I. Sweet	Rhode Island.
C. F. York, Jr.	Massachusetts.

DENTAL SOCIETY ANNOUNCEMENTS.

ODONTOLOGICAL SOCIETY OF THE NATIONAL UNIVERSITY.

AT the initial meeting of the Odontological Society of the National University held July 7, 1896, the following officers were elected for the ensuing year: J. Roland Walton, president; J. H. P. Benson, vice-president; H. Jerome Allen, secretary; Frederick F. Daly, treasurer; Andrew B. Stine, librarian; Edgar E. Rankin, essayist.

H. JEROME ALLEN, *Secretary*,
419 H street, N. E., Washington, D. C.

DENTAL SOCIETY OF SOUTHWESTERN MICHIGAN.

THE Dental Society of Southwestern Michigan will hold its semi-annual meeting at Dowagiac, September 8 and 9, 1896.

The Executive Committee are arranging a very interesting program, and a good attendance is expected.

A cordial invitation is extended to the profession in this and other states.

E. I. BACKUS, D.D.S., *Secretary*,
St. Joseph, Mich.

EDITORIAL.

CATAPHORESIS.

THE history of the discovery of the principle underlying the cataphoric method presents some features of more than ordinary interest, especially as showing that no great truth springs into being complete and full-fledged, but rather by an evolutional process in which its possibilities are gradually developed and utilized for the benefit of mankind. It seems from the statement of Professor Morton (Cosmos, May, 1896, page 403) that the principle of cataphoresis was known as early as 1833, iodin having been introduced into the tissues by a Frenchman in that manner. But the most important study and report following this upon the cataphoric application of drugs was made in 1859 by Dr. B. W. Richardson, of London, Eng.

In the *Dental News Letter* of April, 1859, page 234, we find the following account taken from the *Lancet*, February 5, 1859 :

"*Electro-Chemical Anesthesia.*—Some interesting and important experiments have been commenced by Dr. B. W. Richardson, the author of the Astley Cooper Prize Essay, 'On the Coagulation of the Blood,' on the possibility of producing electro-chemical anesthesia. A sponge, impregnated with chloroform or tincture of aconite, is applied in conjunction with the positive pole of the battery, and a current being passed through the limb, it is found that the anesthetic influence of the agent employed may be brought to bear in this way upon the deeper tissues, and profound anesthesia produced. A public demonstration of this method was given by Dr. Richardson, on Wednesday last, at the Grosvenor place School of Medicine, and the results were satisfactory as indicating the production of deep-seated anesthesia; but the time occupied to effect insensibility was very inconveniently protracted. The further result of these experiments will be watched with interest."

That the partial success of the first experiments suggested the possible value of the new method for relieving the pain of tooth-extraction appears from the following extract from the *Medical News* in the *Dental News Letter*, July, 1859, page 309 :

"*On Voltaic Narcotism.* By B. W. RICHARDSON, M.D.—On February 4, Mr. Kempton, of Princess street, Hanover square, gave me an opportunity of trying this narcotic system in a case of tooth-extraction. The tooth was the last upper left molar, and very firm. It was hollow externally, and the cavity admitted of being easily filled with a dossil of lint, steeped in a narcotic solution composed of five minims each of tincture of aconite and chloroform. Mr. Kempton, after introducing the narcotic, connected a fine excavator with the positive pole of the battery ; and with the point of the excavator pressed on the lint, while I placed the negative pole, tipped with moistened sponge, externally, immediately below the lobe of the left ear. Our apparatus being imperfect for the purpose, and the application of the poles being dependent on the hands, contact was sometimes broken, and occasional slight shocks were given, of which the patient has since complained. These were accidental, and avoidable in another case. After an application of five minutes, I removed the poles, and we found that a sensation of numbness had commenced in the tooth, and extended superiorly and laterally, from the tooth as a center. A new dossil of lint, again saturated with narcotic solution, was inserted in the tooth, and the poles reapplied. In two or three minutes, the sensation of shock was not felt—even when contact was intentionally broken. After seven minutes, the poles were removed, and Mr. Kempton extracted the tooth without the patient experiencing the slightest sensation. He explained that he could hear the breakage between the tooth and its socket, but without the merest trace of pain."

In the DENTAL COSMOS for September, 1859, page 104, will be found this extract from the *Medical News* for August of the same year, giving Dr. Richardson's further communication respecting the progress of his investigations :

"*Voltaic Narcotism.*—The *Medical News*, for August, presents an abstract of Dr. Richardson's further investigations on this subject, from which we make the following extracts :

"'On the human subject I have had the opportunity of applying the process for producing local anesthesia on several occasions. In five instances, the details of which are now in process of publication in the Report of the College of Dentists on "Electricity as an Anesthetic," the process was adopted exactly after the method described in the case of extraction of a tooth given in my last communication. In three of these cases, the success of the process was complete. In the others, it was but partially successful.

"'In cutting operations, the process has been attended with some eminent successes, and with some singular failures. . . .

"'It may be accepted, as a fact, that by the process I have suggested, such degree of local insensibility may be produced, as shall enable the surgeon to perform a large number of operations without pain. I mean this, as a general rule, open, as we have seen, to exceptions. . . .

"'There are certain disadvantages in the process I have suggested, which it would be unfair to suppress. The first disadvantage is, that the time required for the production of insensibility is long ; the second, that some degree of pain is produced during the first stages of the application, which pain, however trifling, destroys the confidence of the patient ; and, thirdly, that the apparatus necessary is cumbersome. The production of vesication of skin, to which I have referred, as following the process, is also objectionable. This is produced by the chloroform.

"'It will occur to many that the objections here noticed are all removable, and of this fact there can be little doubt. In the present initiatory step, I neither claim for the apparatus, nor the narcotic solutions employed, any particular favor ; it is sufficient, at first, to introduce a principle ; details may be left to time and experiment.'"

The report, above alluded to, of the Committee of the College of Dentists of England so far as it relates to their experiments in cataphoresis, is as follows :

"SUMMARY ON VOLTAIC NARCOTISM.—The conclusions arrived at by the committee in regard to eight observations are—

"1. That the application of a narcotic solution to a tooth, in connection with a continuous current of electricity of considerable intensity, leads unquestionably to the production of local anesthesia, so that in some instances the pain of extraction is entirely broken by it.

"2. The anesthesia thus produced is true anesthesia, extending from the tooth to surrounding parts.

"3. The process is limited in its application. As at present understood, it can be only used successfully in cases where the cavity of the tooth is exposed.

"4. The time required in the application of the process in each case is a serious obstacle to its practical usefulness.

5. The pain produced in the first stages of the process, particularly when

the tooth is irritable, is always complained of. The pain dies away, certainly, as the process goes on, but to be successful, there should be no pain at all during any stage.

"6. The above objections are too decided in character to enable the committee to recommend this process as a practice. The members are, nevertheless, of opinion that improvements of an important kind admit of being made in the process; and with the hope that the history thus put forward may serve as the basis of such improvements, they lay the results of their united labors before the profession."

It will be seen that the essential features of the cataphoric method have been known for perhaps half a century, and like many other important observations have fallen into a state of desuetude until some related observation has been made which clothes the earlier research with new interest, and it is rediscovered, placed in a new light, and its practical utility brought out.

Two principal factors are responsible for the renaissance of cataphoresis, viz, the intense interest manifested in the utilization of electricity in dental practice and the discovery of the therapeutic properties of hydrogen dioxid, and the analgesic properties of the cocain salts. With these factors at command the assembling of their activities and their coördination into practical, rational therapeutic methods is a mere matter of detailed study. Much has been accomplished in developing the practical utility of the cataphoric method in dentistry, but much yet remains to be done. The results thus far attained, while encouraging, are doubtless capable of improvement. This implies improvement in devices for managing the electrical current, but more particularly improvements are needed in our equipment of medicaments suitable for therapeutic treatment. It is not by any means demonstrated that cocain is the best drug to use as a dentinal obtunder, or as a local anesthetic in tooth-extraction. The results obtained by Dr. Richardson and others with aconite were sufficiently pronounced to warrant further investigation of them in connection with modern electrical methods.

There is also room for extended investigation of the cataphoric uses of hydrogen dioxid and sodium dioxid, in tooth-bleaching. And especially are we in need of more knowledge regarding the use of metallic electrodes, say of zinc or amalgamated zinc, for use in connection with a salt solution in treating infectious conditions of the periapical region through the pulp-canal cataphorically. There seems to be no good reason why zinc or mercury chlorid should not in this way be driven into the tissues for their sterilizing effect. No recent suggestion in dentistry has been so pregnant with apparent possibilities as that of cataphoresis, and there is reason to believe that the greater part of the subject is yet waiting for development.

BIBLIOGRAPHICAL.

LEHRBUCH DER CONSERVIRENDEN ZAHNHEILKUNDE. Von W. D. MILLER, A.O. Professor an der Universität Berlin. Mit 420 Abbildungen. Leipzig. Verlag von George Thieme, 1896.

The production of a new book by Professor Miller is an event of special interest which in the present instance exhibits the author in a new light. His work as a scientific investigator in the domain of bacterio-pathology is familiar to all students of dental literature, and it is in the röle of scientist that he is best known. His Lehrbuch furnishes us with the practical application of his scientific method of research to the art of conservative dentistry and the teaching thereof. The book is a systematic presentation of the subject, and reflects at all points the scientific scholarship of its author.

As set forth in its preface, there is a definite need for special emphasis upon conservative methods and dental practice in Germany, where the work of the mechanical dentist is too generally accepted as the only dental ideal. The hope expressed by the author that his effort to enhance the interest in and respect for more conservative dental practice is one which cannot fail of accomplishment. There are features of the work which, were it intended for an American audience, would be improved by some modification, but that it is well adapted for its stated field cannot be doubted.

The work is handsomely printed and profusely illustrated, and is a welcome addition to our literature.

◆

OBITUARY.

DR. C. W. SPALDING.

DIED, at Riverpoint, R. I., June 9, 1896, Dr. C. W. SPALDING, in the eighty-second year of his age.

Dr. Christopher W. Spalding was born March 15, 1814, in Rhode Island, of Scotch origin. His ancestors were prominent in the Revolutionary war. He received a common school education. In 1840 he removed from his native state to New York State. In the same year he began his professional studies, and received the degree of Doctor of Dental Surgery in 1851, and that of Doctor of Medicine in 1869.

In 1847–48 Dr. Spalding spent a year in Savannah, Ga. In 1849 he removed from Ithaca, N. Y., to St. Louis, where he resided for many years. He took a leading part in the organization of the Western Dental Society in 1851, and has been prominently identified with the American and several state and city associations, and has been actively engaged in every good work which would tend to elevate the profession of his choice. He was also an ardent advocate of the Homeopathic school of remedies, and was very successful in their administration.

In 1838 Dr. Spalding married Miss Cornelia Anna Erb, also of revolutionary stock. Of this union there is one son, Dr. John H. Spalding, who succeeded to his father's practice in St. Louis.

Dr. Spalding and wife (whose death preceded his over a year and a half) removed to Rhode Island, August, 1890, to spend their declining years in the state of their nativity.

The St. Louis Dental Society passed resolutions of respect to the memory of Dr. Spalding, reciting that they "have lost an earnest and faithful laborer in the healing art," and directing that "a memorial page be set aside in the society's transactions."

DR. LEWIS N. SHIELDS.

DIED, in New York city, February 23, 1894, of pleuro-pneumonia and heart-failure, LEWIS NATHANIEL SHIELDS, D.D.S., in the twenty-eighth year of his age.

Dr. Shields was born at Galveston, Tex., October 27, 1866. He passed a dental pupilage with his brother, Dr. Nelson T. Shields, at Galveston, during 1883–84, and subsequently matriculated at the dental department of the University of Maryland, whence he was graduated in 1886. He then entered practice at Galveston with his brother, which continued until 1892, when they moved to New York city, where they were not long in establishing a very successful practice. He was a member of the Southern Dental Association and of the First District Dental Society of the State of New York.

In Dr. Shields's nature were combined rare strength and sweetness with great will power, and an equal development of gentleness. He was thoroughly practical, and possessed a fine intellect and inventive genius. Even in his last illness his active brain was busy perfecting an invention that, as he said, "would thrill the dental world, and make humanity deeply our debtor." From his early boyhood he loved the study of electricity, and his experiments were many. He made an improvement in the electric mallet which every dentist using it can appreciate. He, however, most earnestly protested against degrading the profession by obtaining patents, and all the results of his researches have been gladly donated. Shortly before his death he gave utterance to this sentiment before the First District Dental Society.

Dr. Shields was never married. His remains were interred in Woodlawn Cemetery, near New York city.—N. T. S.

DR L. R. KOECKER.

DIED, in Philadelphia, Pa., May 6, 1896, of pneumonia, LEONARD R. KOECKER, M.D., in the seventy-fourth year of his age.

Dr. Koecker attended the recent celebration of the birth of Shakespeare at the Forrest Home, in Philadelphia, when he contracted a severe cold, which settled into pneumonia and caused his death.

He was born in Philadelphia, July 16, 1822. His father was a dentist, but, being an Englishman, sent his son to England for his early education, and subsequently to Belgium for several years' study. Returning to this country, Dr. Koecker studied medicine, first at the University of Pennsylvania, and later at the Jefferson Medical College, where he took his degree in 1842. He was for a time associated in practice with the celebrated Dr. McClellan.

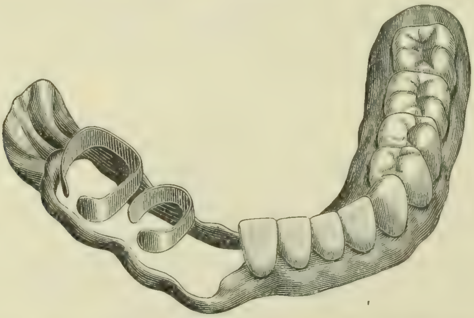
Dr. Koecker, however, early adopted his father's profession of dentistry, and was not long in establishing himself in that specialty. He soon attained a prominent position, numbering among his patients many of the leading families of the city. He was especially skillful in mechanical dentistry, and certainly none but a fine operator could have achieved his remarkable success. He continued his very successful practice up to within about ten years of his death, when he retired.

But Dr. Koecker was not only a dentist; he was a lover of literature, of science, and of art. His love for books caused him to accumulate a valuable library, and in it are found many fine editions. He was also long known as a collector of rare and valuable prints, and a choice accumulation of his was the nucleus of the famous Claghorn collection. He was a worker in wood, paper, and metal, and an exhibit by him at the Centennial Exhibition in Philadelphia in 1876 contained some remarkable examples of illustrating and book-binding, some of them by his own hands. As a metal-worker he was widely known, and he had frequently been consulted by the United States Government on questions involving the construction of intricate machinery.

Dr. Koecker left surviving him a widow and two daughters. His only son died of typhoid fever several years ago.

HINTS, QUERIES, AND COMMENTS.

The Auxiliary Plate Support.—The illustration represents a device suggested by Professor C. J. Essig's method of preventing the slipping backward of partial lower plates. As shown in the cut, but three teeth remained in the lower jaw. The superior arch contained natural teeth on the side from which they were missing in the lower jaw. The stress of mastication would therefore tend to displace laterally any artificial denture that might be inserted. Clasping a bicuspid and molar, as was done in the case, would bring such a strain upon these teeth that they would become loosened. An additional support being indicated, the bar represented in the cut was applied.



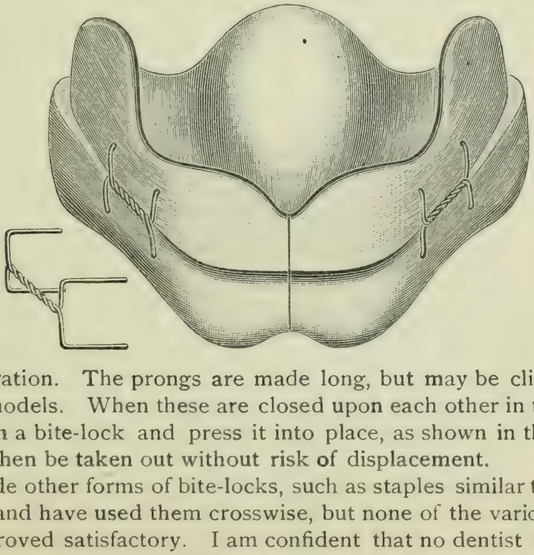
A plate made of two laminæ of 18K. plate No. 30, or a single lamina of No. 24, is swaged to fit perfectly and to extend back on the alveolar ridge posterior to the molar; at this aspect, and at the part next to the cuspid, it is carried over the ridge, so as to offer points of attachment to the bar. Extending across that part of the plate which is beneath the natural teeth remaining, over the plate back of the molar and anteriorly along about a half-inch of the lingual border of the plate on the opposite side, a piece of platinum gold (clasp metal) No. 27 is soldered, being frequently annealed and swaged to perfect adaptation ; broad clasps, No. 22, are fitted to the bicuspid and molar. The piece is now rigid enough to resist all stress. Along the buccal aspect of the arch and about a quarter of an inch below the cervices of the natural teeth a piece of very broad, half-round gold wire was accurately fitted ; resting lightly against the gums along its entire length, its extremities overlapping the points of plate about a quarter of an inch. The pieces were then cemented together, invested and soldered. The teeth were arranged ; a series of cleats soldered in proper position, the teeth attached by means of vulcanite.

There is a matter which suggests itself relative to clasps. A clasp should be broad enough to grasp (when not in view) all of the enamel-surface of a crown. Narrow clasps have a tendency to wear the teeth.

In a majority of cases where these appliances appear to abrade the teeth, the true cause is the fermentation of food débris which insinuates between clasp and crown ; the loss of substance being due to chemical causes, not to mechanical. Very, very rarely does a properly fitted and properly finished clasp cause loss of enamel through mechanical abrasion. Usually when teeth are worn by the presence of clasps, the cementum has been embraced, not the enamel alone.

Keep clasps from close contact with any dental tissue but smooth enamel, make them broad enough, and at least nine out of ten cases of loss of tooth-substance will be found due to chemical solution, not present if proper precautions as to cleanliness are taken by the patient ; the remaining case might be due to mechanical abrasion.—Henry H. Burchard.

Bite-locking.—The common method of making diagonal or cross-cuts on the buccal sides of the upper and lower wax models when taking the bite for a full denture has never been satisfactory to me, as they may separate in the act of removal. I have therefore made and used wire bite-locks like that shown in the illustration. The prongs are made long, but may be clipped off for use in thin models. When these are closed upon each other in the mouth, I slightly warm a bite-lock and press it into place, as shown in the cut. The models can then be taken out without risk of displacement.



I have made other forms of bite-locks, such as staples similar to stationers' paper clips, and have used them crosswise, but none of the various other devices have proved satisfactory. I am confident that no dentist will regret a trial of this bite-lock for firmly fixing together the wax bite models.—Dr. J. A. Robinson, Morrisville, Vt.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

The abbreviations of titles used are those common to bibliographical work, and will, it is presumed, be readily comprehended by any one familiar with dental or scientific publications. Any explanation will be gladly furnished by the compiler. **A** star (*) indicates a Thesis.

Bödecker (C. F. W.) Die Anatomie und Pathologie der Zähne. Autorisierte deutsche Ausg. Wien u. Leipzig, 1896, W. Braumüller, x, 671 p. 8°.

Gerhardt (Karl.) Kehlkopfgeschwülste und Bewegungsstörungen der Stimmbänder. [Spec. Path. u. Therap. xxx Nothnagel, Wien, v. 13, 2. Th., 2. Abth.] Wien, A. Hölder, 1896, 1 pl., 71 pp. 8°.

Amoedo (O.) Seringue hypodermique stérilisable. Rev. odontol., Par., 1896, xxxvi, 203-207.—**Anderson** (C. T.) Crowns. Brit. J. Dent. Sc., Lond., 1896, xxxix, 488-494.—**Andrew** (J. J.) Case of odontome of the upper jaw. Tr. Odont. Soc. Gr. Brit., Lond., 1896, n. s., xxvii, 42-44, 1 pl.—**Angelesco.** Accidents post anesthésiques. Presse méd., Par., 1896, 233.—**Anichkin** (A.) [Sur le mécanisme de l'articulation maxillaire.] Izviest. S -Peterb. biol. lab., 1896, i, 23-63, 7 pl.—**Armstrong** (G. E.) Carcinoma of the tonsil. Montreal M. J., 1895-6, xxiv, 958.—**Bacon** (J. E.) On the treatment of antrum disease. Am. Therapist, N. Y., 1895-6, iv, 326-330.—**Baker** (A. E.) A case of persistent periostitis treated by replantation. J. Brit. Dent. Ass., Lond., 1896, xvii, 338-343.—**Baratoux.** Des corps étrangers du sinus maxillaire. Progrès dent., Par., 1896, xxiii, 9; 138.—**Bauer** (S.) Natrium peroxyd. Vrtljschr. f. Zahnh., Wien, 1896, xii, 167-176.—**Bennett** (F. J.) The nature of the translucent zone of dental caries. Tr. Odont. Soc. Gr. Brit., Lond., 1895, n. s., xxvii, 155-167, 2 pl.—**Bentley** (C. E.) New outlooks of dentistry. Dental Rev., Chicago, 1896, x, 412-417.—**Berger.** Sur un cas d'ostéome du maxillaire inférieur. Bull. et mém. Soc. de chir. de Par., 1896, n. s., xxii, 139-153.—**Berger** (H.) Zur Casuistik des Strophulus infantum. Wien med. Presse, 1896, xxxvii, 738.—**Billet.** Fracture double du maxillaire inférieur; contention par une gouttière en aluminum, fixée par des rivets; guérison. Arch. prov. de chir., Par., 1896, v, 289-294.—**Bishop** (D. D.) & **Ryan** (L.) Noma and allied diseases of the mouth; a report of three cases, with pathologic examination. Tr. Chicago Path. Soc. (1894-5), 1896, i, 252-264.—**Boucheron.** Excretion de l'acide urique par la salive chez les uricémiques. Compt. rend. Soc. de biol., Par., 1896, 10. s, iii, 454-456.—**Brand.** Chirurgie der Mundhöhle und Processe. Berl. klin. Wchnschr., 1896, xxxiii, 522-525.—**Breneman** (A. A.) Some of the physical properties of metals. Internat. Dent. J., Phila., 1896, xvii, 355-365.—**Brindel.** Des rétrécissements de l'isthme du pharynx, leur pathogénie et leur traitément. Rev. hebd. de laryngol. [etc.], Par., 1896, xvi, 513; 545.—**Brown** (P.) The advantages of cataphoresis in dental operations. Internat. Dent. J., Phila., 1896, xvii, 365-369.—**Campion** (G. G.) Studies in superior protrusion. Tr. Odont. Soc. Gr. Brit., Lond., 1895, n. s., xxvii, 127-149, 1 pl.—**Chupein** (T. F.) The construction of artificial teeth. Dental Office & Lab., Phila., 1896, 4. s., x, 1; 65.—**Cigrand** (B. J.) New methods for producing bicuspid-band crowns with porcelain facings and cusps. Dental Rev., Chicago, 1896, x, 402-406.—**Clark** (C. E.) Adenoid vegetation of the nasopharynx, with report of cases. Kansas City M. Index, 1896, xvii, 244-247.—**Collins** (W. J.) Orbito-maxillary diseases. Tr. Odont. Soc. Gr. Brit., Lond., 1895, n. s., xxvii, 15-40.—**Cunningham** (G.) The immediate treatment of irregular teeth. *Ibid:* 182-196.—**Curtis** (G. L.) A plea for conservative oral surgery; with practical illustrations. N. York M. J., 1896, lxiii, 833-837.—**Custer** (L. E.) The electrical aspect of cataphoresis. Dental Reg., Cincin., 1896, l, 261-268.—**Dauchez** (H.) Amygdalotomie: galvano-cautère et thermo-cautère; étude comparative. France méd., Par., 1896, xliii, 305.—**Deaths** [2.] from chloroform given for a dental operation. J. Brit. Dent. Ass., Lond., 1896, xvii, 313.—**De Blois** (T. A.) The mouth breather. Med. & Surg. Rep. Bost. City Hosp., 1896, 7. s., 160-166.—**De Hart** (J. N.) A safe method by which anesthetics may be administered with oxygen. J. Am. M. Ass., Chicago, 1896, xxvi, 1211-1214.—**Delorme** (E.) Sur un procédé de restauration des pertes de substance étendues de la voûte palatine, en particulier des pertes de substance antéro-postérieures. J. d. conn. méd. prat., Par., 1896, 195.—**Dickinson** (Mary E.) Hypertrophy of the lingual tonsil. Buffalo M. & S. J., 1895-6, xxxv, 878-880.—**Diederichs** (K.) Mikroskopische Untersuchungen der Zähne und Knochen. Zahntech.

Reform, Berl., 1896, xvi, 32-36.—**Dubois** (Paul.) [1848-96] (Nécrologie.) Rev. odontol., Par., 1896, xxxv, 146. ——— Sa mort et ses obsèques. Odontologie, Par., 1896, 2. s., iii, 193-215.—**Dunn** (J. A.) Cervical fillings and clamps. Dental Rev., Chicago, 1896, x, 418-421.—**Dunn** (W. A.) Surgical diseases of the mouth, nose and throat. Med. Era, Chicago, 1896, xii, 207-209.—**Dunogier** (S.) De la prothèse appliquée au traitement des empyèmes de l'antre d'Highmore. J. de méd. de Bordeaux, 1896, xxvi, 245-249.—**Dzierzawski** (B.) Ein Fall von Contractur des musculus pterygoideus externus in Folge der Erkrankung eines Zahnes. Vrtljschr. f. Zahnh., Wien, 1896, xii, 176-180.—**Edward** (J. H.) Fracture of the alveolus of the lower jaw. Lancet, Lond., 1896, i, 1643.—**Farlow** (J. W.) The use of the écraseur and punch in the removal of tonsils. Med. & Surg. Rep. Bost. City Hosp., 1896, 7. s., 167-170.—**Félizet.** Sur un travail du Dr. Gaillard intitulé: méthode physiologique de redressement des dents. [Rap.] Bull. et mém. Soc de chir. de Par., 1896, n. s., xxii, 19-24.—**Février.** Un cas d'actinomycose à forme osseuse du maxillaire inférieur. Rev. méd. de l'est, Nancy, 1896, xxviii, 267-271.—**Fleury.** D'une réimplantation (greffe par restitution) effectuée en plein foyer de périostite aiguë. Rev. odontol., Par., 1896, xxxvi, 220.—**Foster** (H.) Report of two cases of pharyngomycosis. Kansas City M. Index, 1896, xvii, 243.—**Fothergill** (J. A.) Two cases of transplantation. J. Brit. Dent. Ass., Lond., 1896, xvii, 283.—**Frick** (T.) Solila. Internat. Dent. J., Phila., 1896, xvii, 372-375.—**Frohmann** (D.) Mélange analgésique pour l'extraction des dents. Semaine méd., Par., 1896, xvi, 611. ——— Ueber Schleich'sche Anaesthesie bei Zahnextractionen. Therap. Monatsh., Berl., 1896, x, 267-269.—**Goadby** (K. W.) The bacteriological aspect of dental caries. J. Brit. Dent. Ass., Lond., 1896, xvii, 298-307.—**Goldsmith** (S. L.) An interesting case. [Employment of hypnotism.] Internat. Dent. J., Phila., 1896, xvii, 370.—**Harrison** (F.) The new photography and its application to dental practice. J. Brit. Dent. Ass., Lond., 1896, xvii, 343, 2 pl.—**Hattyasy** (L.) Versuche mit Tropacocaïn. Vrtljschr. f. Zahnh., Wien, 1896, xii, 161-165.—**Hoadley** (A. E.) New treatment for epithelioma of the lip, with report of a strange case. Chicago M. Recorder, 1896, x, 394-397.—**Huguenin** (P.) Les tumeurs adénoïdes. Rev. odontol., Par., 1896, xxxvi, 223-238.—**Hunt** (Phineas George Canning.) [1827-96.] (Obituary.) Dental Cosmos, Phila., 1896, xxxviii, 532. ——— *Also:* Internat. Dent. J., Phila., 1896, xvii, 399.—**Jack** (L.) Electrical osmosis in the treatment of acute dentinal sensibility. Internat. Dent. J., Phila., 1896, xvii, 341-345.—**Jocqs** (R.) Guérison d'une plaque lisse de la langue chez un syphilitique par le bleu de méthyle. J. de méd. de Par., 1896, 2. s., viii, 275.—**Karolyi** (M.) Ueber Dr. de Trey's neues Goldpräparat Solila. Vrtljschr. f. Zahnh., Wien, 1896, xii, 131-136.—**Kayser** (R.) Zur Kritik der Sogen. Pharyngotherapie. Therap. Monatsh., Berl., 1896, x, 250-254.—**Keyser** (N. H.) Bridge work on vital teeth. Dental Office & Lab., Phila., 1896, 4. s., x, 33-35.—**Kiesel.** Eucaïn, ein neues lokales Anästhetikum. Zahntech Reform, Berl., 1896, xvi, 105-109.—**Koecker** (Leonard R.) [1822-96.] (Obituary.) Internat. Dent. J., Phila., 1896, xvii, 401.—**Kreutzer** (F.) Varietäten der Kaumuskeln. Anat. Hefte, Wiesb., 1895-6, vi, 609-636.—**Küttner** (H.) Die Geschwülste der Submaxillar-Speicheldrüse. Beitr. z. klin. Chir., Tübingen, 1896, xvi, 181-256, 1 pl.—**Lacoarret.** Pseudo hypertrophie post-diphtérique des amygdales. Rev. hebd. de laryngol. [etc.], Par., 1896, xvi, 609-611.—**Lesshaft** (P.) [Sur le mécanisme des mouvements de la langue.] Izviest. S.-Peterb. biol. lab., 1896, i, 64-74.—**Liscia** (A.) Una semplice modificazione alle commune maschera ser la cloro-narcosi. Gazz d. osp., Milano, 1896, xvii 443-445.—**Lukasiewicz.** Ueber das an der Mundschleimhaut isolirt vorkommende Erythema exsudativum multiforme. Wien. Klin. Wchnschr., 1896, ix, 483-485.—**Lund** (F. B.) Recent advances in the methods of local anesthesia. Med. & Surg. Rep. Bost. City Hosp., 1896, 7. s., 106-117.—**McKuen** (G. H.) A case of stammering due to adenoid vegetations, and the result of treatment. Therap. Gaz., Detroit, 1896, 3. s., xii, 361-363.—**Mummery** (J. H.) Hints on photo micrography. Tr. Odont. Soc. Gr. Brit., Lond., 1895, n. s., xxvii, 85-105.—**Moorehead** (W. W.) Cataphoresis. Dental Rev., Chicago, 1896, x, 422-426.—**Morton** (T. S. K.) A case of removal of the major part of the lower jaw for sarcoma. Phila. Polyclin., 1896, v, 214.—**Morton** (W. J.) The X ray and its application in dentistry. Dental Cosmos, Phila., 1896, xxxviii, 478-486.—**Naegeli-Akerblom** (H.) Zur Therapie der Dentitis difficilis. Centralbl. f. Kinderh., Leipz., 1896, i, 79.—**Need** (The) for better legislation in medicine and surgery. J. Brit. Dent. Ass., Lond., 1896, xvii, 370-379.—**Newkirk** (G.) Shock. Dental Rev., Chicago, 1896, x, 406-412.—**Nicholson** (W. P.) Ligation of external carotid artery in conjunction with exsection of jaws and the inoperable diseases of the same. J. Am. M. Ass., Chicago, 1896, xxvi, 1103-1106.—**Ohls** (H. G.) Empyema of antrum simulating caries of teeth; and a simple method of transillumination. *Ibid:* 1171.—**Ornstein** (S.) Unregelmässiger Durchbruch der zweiten Zähne; Unterzahl der Zähne. Vrtljschr. f. Zahnh., Wien, 1896, xii, 154-160.—**Palmer** (S. B.) Third set of teeth. Internat. Dent. J., Phila., 1896, xvii, 371.—**Partsch** (C.) Ueber Tamponade. Deutsche Monatschr. f. Zahnh., Leipz., 1896, xiv, 217-229. [Discussion], 244-

247.—**Péchin** (A.) Contribution à l'étude des affections oculaires et des sinusites de la face d'origine dentaire. Rev. gén. d'opht., Par., 1896, xv, 193-213.—**Quedot** (C.) Hémorragies consécutives à l'extraction des dents. Rev. odontol., Par., 1896, xxxvi, 196-203.—**Randorf.** Un nouvel or et un nouveau ciment. Odontologie, Par., 1896, 2. s., iii, 215-217.—**Regnault.** Des maxillaires dans les races humaines. Med. mod., Par., 1896, vii, 286; 349.—**Renon.** Recherche des spores de l'Aspergillus fumigatus dans le mucus nasal et la salive de personnes saines et malades. Compt. rend. Soc. de biol., Par., 1896, 10. s., iii, 456-459.—**Rhein** (M. L.) The oral expressions of malnutrition. Dental Cosmos, Phila., 1896, xxxviii, 486-497. [Discussion], 510-512.—**Rosenfeld** (R.) Erfahrungen bei 150 Aethernarkosen. Prag. med Wchnschr., 1896, xxi, 248-250.—**Roughton** (E. W.) Stomatitis. Brit. J. Dent. Sc., Lond., 1896, xxxix, 444-450.—**Rowe** (W. W.) A remarkable case of necrosis. Items Interest, Phila., 1896, xviii, 321.—**Royet.** Des végétations de Leptothrix buccalis sur la langue et le pharynx au point de vue clinique. Province méd., Lyon, 1896, x, 270-273.—**Ruge** (H.) Die Tuberculose der Tonsillen vom klinischen Standpunkte. Arch. f. path. Anat., etc., Berl., 1896, cxliv, 431-466.—**Runschenbach** (R.) Siegfried's regulating spring. Dental Cosmos, Phila., 1896, xxxviii, 497-500.—**Sabrazès.** Les polypes de la face interne des joues. Gaz. hebd. d. sc. méd. de Bordeaux, 1896, xvii, 246-250.—**Scheff** (J.) *jun.* Solila von Dr. E. de Trey. Vrtljschr. f. Zahnh., Wien, 1896, xii, 121-131.—**Schmitt.** Névralgie épileptique spasmodique du nerf maxillaire inférieur. J. d. sc. méd. de Lille, 1896, i, 535-538.—**Short** (T. S.) Observations on a series of 550 timed nitrous oxide cases. J. Brit. Dent. Ass., Lond., 1896, xvii, 271-282.—**Standish** (M.) On light. Internat. Dent. J., Phila., 1896, xvii, 345-354. [Discussion], 377-384.—**Starck** (H.) Die Zusammenhang von einfachen chronischen und tuberkulösen Halsdrüsenschwellungen mit cariösen Zähnen. Beitr. z. klin. Chir., Tübingen, 1896, xvi, 61-89.—**Stephan** (E.) Neuer Muffel-Ofen für Emaillirarbeit. Zahntech. Reform, Berl., 1896, xvi, 1-6.—**Stoker** (G.) On impaired movements of the vocal cords. Clin. J., Lond., 1896-7, viii, 104-108.—**Storer** (W.) Dental vulcanite. Dental Reg., Cincin., 1896, l, 268-272.—**Tanguy.** Resection partielle du maxille inférieur; prothèse immédiate. Rev. odontol., Par., 1896, xxxv, 150-153.—**Tapie** (J.) Leucoplasie linguale et épithélioma. Arch. méd. de Toulouse, 1896, ii, 97-102.—**Telschow.** La véritable cause de la carie dentaire et sa guérison. Odontologie, Par., 1896, 2. s., iii, 239-243.—**de Terra** (P.) Pulpitis polyposa e sarcomatosa. Vrtljschr. f. Zahnh., Wien, 1896, xii, 180-186. ——— Salubrol, ein Ersatz für Jodoform. Deutsch. Monatschr. f. Zahnh., Leipz., 1896, xiv, 230-240.—**Thomas** (J. J.) The innervation of the soft palate. Med. & Surg. Rep. Bost. City Hosp., 1896, 7. s., 171-188.—**Tims** (H. W. M.) On the origin of the mammalian teeth. Brit. J. Dent. Sc., Lond., 1896, xxxix, 433-443. [Discussion], 507-513.—**Tomes** (C. S.) A case of calcification of a widely-exposed pulp. J. Brit. Dent. Ass., Lond., 1896, xvii, 290. ——— Notes on amalgams. Tr. Odont. Soc. Gr. Brit., Lond., 1895, n. s., xxvii, 47-73.—**Waterhouse** (H. F.) Affections of the mouth, palate, tongue, tonsil and pharynx. Syst. Surg. (Treves), Lond., 1896, ii, 450-543.—**Whinery** (C. T.) Dental hygiene. Toledo M. & S. Reporter, 1896, ix, 316-322.—**Wickham** (W.) Neuralgia of the fifth nerve. *Ibid:* 310-312.—**Williams** (J. L.) On the formation and structure of dental enamel. Dental Cosmos, Phila., 1896, xxxviii, 101; 269; 453.

◆

LIST OF UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING JUNE, 1896.

June 9.—No. 561,561, to B. S. Brown. Dental engine.
" *16.*—No. 561,995, to L. W. Jones. Tooth brush.
" " No. 562,116, to E. A. Bryant. Controller for electric motors.
" *23.*—No. 562,390, to A. P. Gould. Dental chair.
" " No. 562,391, to A. P. Gould. Surgical and dental chair.
" " No. 562,490, to Robert Richter. Rubber-dam clamp.
" " No. 562,742, to O. H. and A. F. Pieper. Dental engine.
" *30.*—No. 562,793, to F. H. Berry. Dental engine.
" " No. 562,800, to A. W. Browne. Surgical engine.
" " No. 563,131, to B. S. Brown. Dental hand-piece.

THE

DENTAL COSMOS.

VOL. XXXVIII. PHILADELPHIA, SEPTEMBER, 1896. No. 9.

ORIGINAL COMMUNICATIONS.

THE ADVENT OF DENTAL SCIENCE IN THE UNITED STATES.

BY WILLIAM H. TRUEMAN, D.D.S., PHILADELPHIA, PA.

(Read before the Academy of Stomatology, February 25, 1896.)

An American citizen who is not quite sure which of the two, Louis Napoleon or Julius Cæsar, commanded the colonial troops at the battle of Bunker Hill, may be quite competent to run a sawmill or drive a stage; he may be a brilliant artist, a skillful dentist, or a successful physician, nevertheless he would hardly pass as a well-informed gentleman. The citizen of any country who takes no interest in his country's history, feels no interest in its heroes or in those of its citizens whose active work has made and maintained it a nation, a citizen without patriotism, is a citizen the nation may lose with profit.

This is equally true of the followers of any calling. It is true that some occupations give but little stimulus to thought; they are so purely mechanical, so unvaried, that they attract those only who are content to lead a treadmill existence. It is true, also, that in all occupations we find some who are content to follow them in a treadmill fashion; they step out as the "wheel goes round," and are fully satisfied if they keep their footing; constantly going, never advancing. To these, of course, whether blacksmiths or dentists, the history of their calling, its past, its heroes, its literature, or its future, is a matter of no interest and of no concern. They are fully satisfied so long as it provides for them, in return for a measure of exertion, the means of existence. They feel that they owe nothing to those who have provided for them the trade they follow, those who have invented the methods and tools they daily use, or those who, in a thousand ways, have made the product of those methods and tools a daily necessity in the community. They feel no concern to so do that those who come after them shall find those methods and tools improved by a life's use, and their importance to the community correspondingly increased. To such as these, in the dental profession, any effort to trace the history of dental science, to keep in memory the life and work of those whose earnest labors have contributed step by step to its onward progress, seems a waste of time. What profit, they ask, to know when or by whom this or that method was introduced? or to know what the dentists of a hundred years ago thought of the origin of decay? Does that help me to fill this tooth? What concern to me whether Smith, Brown, or Jones was the first dentist in the United States? or where they got their knowledge? or where or how the next generation shall get theirs? I have myself to take care of. Let them do the same.

Again it is asked: Why bother with the past? Are not the unsolved problems that daily confront us enough, and of more importance than the theories with which our grandfathers wrestled? To those who thus question, and to all zealous members of our profession, I most earnestly commend the closing paragraphs of a paper by the late Dr. John J. R. Patrick, entitled "The First Period in the History of Dentistry."* He says, "It is to be hoped that the time is not far distant when the profession everywhere will be convinced of the importance of becoming more intimately acquainted with the researches and views entertained on the subject of dentistry by some of the most intellectual men the world has ever produced. It is to be hoped that the profession will see the advantage and necessity of a dental cyclopedia or summary of dental knowledge; not a system, but a work that would rescue valuable papers relative to dentistry that are now resting in comparative obscurity in the archives of scientific societies, and that are now in a manner lost to the profession. . . . One great advantage the profession would have in the possession of such a work would be that when a new theory was advanced it could be tested by comparing it with doctrines of a similar nature advanced in former times. Certainly every age should profit by the experience of the preceding ones; but without a record of what has been accomplished each investigator commences a new series of trials, and wanders over the same ground in search of truths which have been long ago discovered; or adopts theories that have been long ago discarded. The views of our predecessors may be justly regarded as beacon lights set up to guide our footsteps from the pitfalls of error."

The educational value of such a work as that suggested by Dr. Patrick would be beyond estimate. Not only would it unfold a mine of useful knowledge unknown and inaccessible to a vast majority of the profession, and would prove a vantage ground from which future investigators could begin their labors; but the knowledge of what has been done in the past, the insight it would afford of the men to whom we are so greatly indebted for much that we know, and who are so often contemptuously spoken of simply because they and their labors are unknown, would widen out and expand our perceptive faculties. The man who knows all, and feels that he is far in advance of all that have gone before, has but little incentive for further effort; while he who feels that the unfinished work of a long line of illustrious predecessors has been relegated to him for completion, naturally feels that so important a task calls for his best efforts.

---

* *Dental Review*, Chicago, vol. iii, July, 1889, page 426.

The misinformation and lack of interest concerning the history of our profession and its literature, especially in our own land, is no credit to us. I say especially in our own land, because I am far better acquainted with dentists and dentistry, and their opportunities, here than elsewhere. We may, perhaps, be no worse than others, but that it exists at all is a reflection upon our educational system. I do not reflect upon the colleges; I regard the instruction there received but the beginning of a systematic professional education; no matter how full or complete it may be, it can never be more than a beginning,—a beginning of that which should continue as long as professional life lasts. If I read the history of my profession aright, the past teaches that too long a *training* stifles original thought, dwarfs and narrows the man, makes him the slave of rules rather than the student of nature. Has it not so proved in France and England? Why is it that they, beginning so long before us, and after having advanced so far before we began, should have permitted us to so greatly outstrip them? For many long years, in the older nations, the professional men have been the ideal which the profession in this country are now clamoring for. They came to the professional schools with minds well stored with classical knowledge, and with well-formed habits of study. In acquiring this they learned a lesson, methinks, which hampered them all through life. They had learned to depend more on their teachers than on themselves. The pioneer dentists in our own land, for the most part, entered practical life while the mind was still active and alert. Untrammeled by the dogmas of trained teachers or the rigid exactions of time-honored theories, they developed a self-reliance, a readiness to adapt to present use available means, and an alertness for better methods and appliances, with skill to provide them, to which their brothers on the other side were strangers. Many were mechanics, trained in the machine shop or at the blacksmith's forge, the carpenter's or the jeweler's bench. It is to them and to their influence the dental profession the world over owes much that has made the *fine art* of dentistry a possibility. The same causes that gave dentistry as practiced in the United States its uplift, have given the same uplift to other pursuits. Nowhere else in the wide world has practical mechanics become so practical. The labor-saving machinery, the efficient well-designed tools, the economic and ready methods, the outcome of American skill and American ingenuity, have a world-wide reputation. They are the immediate outgrowth of, first, a necessity of accomplishing much with meager resources; second, a field untrammeled by conventionalities and unhampered by time-honored usages.

Have a care, that in the effort to improve educational methods, that which has made dentistry great in the United States is not supplanted by that which in other lands has hampered its growth.

I am impressed that we can in many ways learn much by a close study of our professional history and its literature. If we gain no new facts that we can at once turn to profit, we will have at least broadened our knowledge, and be in a position to utilize more closely, in solving the problems we daily meet, our time and talent.

The early history of dentistry in our own land is difficult to trace. The dentist usually leads a quiet, unassuming life. He is not called upon, as are the members of sister professions, to take active part in public affairs. The physician is naturally a prominent man in the community. He is constantly consulted in reference to matters concerning the public health, the water supply, sewage disposal, etc. ; the best means to guard against disease, and in a thousand ways, outside of his strictly professional duties, he and his profession are constantly brought into public notice. The lawyer is preëminently the man of affairs ; while the clergy, as their special province, have in charge matters esteemed by thousands of far more importance than life or health. On these accounts the history of these professions and of many who followed them are well preserved in readily accessible records. Of the dentist, outside of newspaper and other advertisements, and professional literature, we seldom find mention. Many dentists of ability, and who during a long life did for the community efficient service, have left of their labors little or no available record.

The first advent of dentistry in our midst seems to have been at Boston. In 1636, the Plymouth Company, an association organized for the purpose of colonizing that section of country, sent out from London to Boston a company of physicians, an apothecary, and three barber surgeons. Now, it is not true that the barbers were the only dentists of that period. There were at that time many medically educated men who confined their practice to disorders of the teeth and gums, and who attained therein much skill and expertness. They brought into line irregular teeth, treated diseased conditions of the teeth and gums, cleaned and filled teeth, extracted and replaced with artificial substitutes those which had ceased to be useful. These were called then, as those who do such work are now called, dentists ; they were professedly dentists ; collectively they were known and honored as members of the dental profession. When and where these terms originated is lost in the dim, misty past. It is true, then as now, that in isolated communities, communities so small that they are unable to support a dentist, there is usually found some one, blacksmith or schoolmaster, with more courage or ability than his neighbors, who is able and willing to relieve sufferers of an aching tooth, or to suggest remedies for the ills to which the teeth are subject. That does not, however, make them dentists. Such are no more entitled to be considered members or representatives of the dental profession than is a mere vendor of quack medicine, or an amateur midwife, or a natural bone-setter, to be considered a member of the medical profession.

The barber surgeon seems to have been used as a somewhat similar makeshift ; more closely allied, however, to the medical than to the dental profession. When in course of time, as little by little his multi-vocation became specialized, dentistry proper had no part. This is clearly shown by the history of the barber surgeons' association in England.* The Company of Barber Surgeons was first incorporated by Edward IV, in 1461. In 1511, an act of parliament was passed prohibiting any one practicing surgery without first having passed an examination as to qualification. In 1540 the title of the organization was changed and became "The Company of Barbers and Surgeons," the barbers being at the same time restricted in surgical practice to drawing teeth. Five years later, the preamble to an act of parliament still further separating these former close companions recites that the trade or practice of a barber is foreign to, and independent of, the practice of surgery. In 1745, the barbers and surgeons separated, each forming an association of their own; the surgeons organizing as "The Commonality of the Art and Science of Surgery," a title frequently shortened to "The Surgeons' Company." This in 1800 gave place to the "Royal College of Surgeons of London." It is probable that the barber surgeon drifted into dental practice from his position as a public valet, a beautifier of the person. From hair-dressing to teeth-cleaning is but a step. The gentleman of leisure of the olden time would have his morning shave, the brushing up and fresh powdering of his wig, and his teeth polished, at the same time and in the same shop. Of this we have evidence from an advertisement in a New York paper published about 1766, which reads, "*James Daniel, Wigmaker and Hairdresser, also Operator upon the Teeth.*"* The more progressive of these public valets advanced still farther into dental lines when circumstances encouraged them so to do, especially as beautifiers of the person and purveyors to personal comfort, adding tooth-drawing and replacing of lost teeth. All this was, however, outside of his legitimate calling, and only acceptable to the community when nothing better was attainable.

---

* Memorial History of Boston, Justin Windsor, 1881, vol. i, page 502.

Of the three barber surgeons sent to Boston I have so far been unable to find any professional record. The name of one only, William Dinely, is known.† He seems to have been unfortunate. Shortly after his arrival he got into trouble by embracing Anne Hutchinson's peculiar religious notions. In 1639, a Roxbury man suffering from toothache sent for him to come and draw the tooth. He started on this mission of mercy accompanied by a maid who brought the message. They were overtaken by a violent storm, lost their way, and were found some days after frozen and dead. His misfortunes have preserved his name to posterity. Madame Dinely shortly after gave birth to a son, who was named, with homely pathos, Fathergone Dinely.

The next reputed dentist of whom I find record is Isaac Greenwood, Jr., also of Boston.‡ The family came from Norwich, England; Nathaniel Greenwood arrived in Boston about 1650, and engaged in business as a ship carpenter. He died in 1685, leaving two sons, Samuel and Isaac. Isaac became the first professor of mathematics of Harvard College, and was the father of Isaac, Jr., whose name is first brought to notice in a newspaper account of the Boston massacre of March 5, 1770; he is there described as an ivory turner, a business "naturally embracing that of dentist," so says the chronicler. Dr. Chapin A. Harris refers to him in his Dictionary of

---

* Annals and Occurrences of New York City and State, John F. Watson, 1846, page 281.

† Memorial History of Boston, Justin Windsor, 1881, vol. i, page 502.

‡ Memorial Biographies of the New England Historical and Genealogical Society, Boston, 1880, page 268.

Dental Science as "the first practical dentist in Boston."* So careful and painstaking a writer, who had the advantage of mingling with many who had personal knowledge of those early times, we may safely assume knew whereof he wrote. Of Isaac Greenwood's five sons, three became dentists; two, John and his younger brother, William Pitt, will ever be remembered for their good work as pioneer dentists in the United States.

The story of John Greenwood,† as written by himself toward the latter part of his life, although little more than a mere sketch, probably unfinished owing to his sudden death from apoplexy in 1815, is particularly interesting. Born in Boston in 1760, he attended school until his thirteenth year, when he was apprenticed to his uncle, a cabinet-maker of Portland, Maine. Two years later the battle of Lexington brought the strained relations between England and those of her American colonies now embraced within the United States to a crisis. A peculiar train of circumstances led young Greenwood to enlist in the American army rapidly gathering near Boston, and shortly after, at Bunker Hill, he received his first baptism of fire. With his company he assisted to cover the retreat of that patriot band whose defeat brought no disgrace to the vanquished and gave no comfort to the victors. Later he took part in that first and most disastrous campaign in Canada, and ended his army career, his term of enlistment having expired, immediately after taking part in Washington's masterly surprise of the Hessians at Trenton. He enlisted as a fifer, a position which exempted him from many hardships and dangers; but of this he took no advantage, but manfully and courageously did his full duty as a soldier. After a few weeks' rest at his father's home at Boston, he entered the naval service as a privateersman, and in various capacities served therein until the close of the war. We now find him in New York city, almost penniless. Refused assistance by his brother, Clark Greenwood, who was then in that city in practice as a dentist, through the favor of a friend he began business in a small way as a nautical and mathematical instrument maker, with most promising success. A mere chance turned his attention to dentistry, and developing therein exceptional skill, he soon acquired a large and lucrative practice.

John Greenwood, when he performed his first dental operation, if the extraction of a tooth may be so termed, was a skillful mechanic. So satisfactorily was this extraction done, that the patient, a physician of repute, asserted that he had never had a tooth removed so carefully or with so little pain, and declared that he would thereafter recommend to him any of his friends or patients requiring a like service. In a little while, so promising seemed this new vocation that he sold out his business and resolved to devote his whole time and attention to dentistry, determined to make himself a master in his calling. Passing beyond the usual limits of dentistry, tooth-drawing, tooth-replacing, and tooth-filling, he boldly entered the domain of oral surgery, and acquired fame in successfully treating, by novel surgical procedure, diseases of the maxillary sinus.

He was a type of the men who have made illustrious and honored the dental profession in the United States. His education was meager, his opportunities for acquiring professional knowledge limited; he made, however, the most of both, and with unflagging zeal and untiring industry this carver of ivory and worker in brass reached a well-merited and recognized position in the front rank of his profession.

---

* Harris's Dictionary of Dental Science (1849). John Greenwood, page 333.

† *American Journal of Dental Science*, vol. i, 1839, pages 73, 97, 113.

His younger brother, William Pitt Greenwood,* was also an ivory turner. After spending a short time in New York assisting his brother, he located in Salem, Massachusetts, as a dentist in 1790. A few years later he removed to Boston, continuing in dental practice until incapacitated by age. He died at Boston, May 10, 1851, on the eighty-fifth anniversary of his birth. He early acquired a reputation as a skillful carver of bone dentures; practiced while the fad lasted, replantation; and during his long professional career enjoyed and maintained an excellent reputation and practice. He received in November, 1840, the honorary degree of D.D.S. from the Baltimore College of Dental Surgery. He was present at a meeting of the American Society of Dental Surgeons at Boston, July 19, 1842, when he gave to the society an interesting account of the profession as he knew it some fifty years before. It was said of him then, "that although approaching eighty years of age, his step is still elastic, and his mind possessed of the vigor and freshness of youth."†

Another Boston lad, a few years younger than John Greenwood, while perhaps not so well known (for it was not his fortune to have been dentist to his Excellency, the first President of the United States), will ever occupy an honorable position in the annals of dentistry in America. Of his early life but little is known. He, too, had joined the patriot band, and we first find record of Major Josiah Flagg, a youth of but eighteen years, as being in the army while the French and Americans were in winter quarters, side by side, near Providence, R. I., 1781–82. He served until the close of the war, and then, shortly after, began practice as a dentist in Boston. During the war of 1812 his martial spirit was again aroused: he entered the naval service, was soon taken prisoner and carried to England, where he was paroled. His enforced stay in a foreign land was made less irksome by the kind attentions he received, in recognition of his well-merited reputation, from the learned surgeons of London. While his thoughts were of home and the profession he loved, under the most pleasant auspices he made the most of the opportunity to increase his medical knowledge, and in social intercourse with many distinguished medical teachers of London, attending their lectures, assisting in their practical work, and in the study of their methods of teaching, he gathered much that he fondly hoped to make useful to his brethren at home. The war over, he was soon again in Boston, anxious that they should share with him the good he had learned; but shattered health frustrated his plans. Seeking rest and health, he went to Charleston, S. C., and died there, September 30, 1816, aged fifty-three.‡ He was the first of a family whose "brainy" men have made their mark in various pursuits. In dentistry they have developed a faculty of early getting to the front and staying there. As teachers and as investigators they have proved earnest, progressive, aggressive, and uncompromising.

---

* Memorial Biographies of the New England Historical and Genealogical Society, Boston, 1880, page 268.

† *American Journal of Dental Science*, vol. iii, September, 1842, pages 69, 74, 77.

‡ *Dental News Letter*, vol. vii, July, 1854, page 212.

Let us now consider for a few moments an event which I think has had an important bearing upon dental history in the United States. It was a sad and anxious winter, that of 1777 and 1778, for the leaders of the American Revolution. The outlook of their attempt to establish a government of the people, by the people, and for the people, was gloomy in the extreme. When the fate of the new nation hung as on a balance, it was reserved for a citizen of Philadelphia—our representative in Paris—to transform impending disaster into a grand success, and in so doing transplant to these shores, from the land where it had received its then highest development, the science of dental surgery. Dr. Franklin's world-wide reputation as a scientist secured for him a warm and enthusiastic reception in Paris, for Paris was then and is now what Francis the First's ambition had made her. Notwithstanding that she has been torn by internal strife, sacked by foreign foes, deluged with blood, and baptized by fire time and again, she still remains the metropolis of the scientific world.

While other monarchs of his time were busy with conquest, the gratification of personal vanity, or less laudable pursuits, Francis the First of France was ambitious to make the capital of his domain a literary and scientific center. Under his wise rule, all that promised usefulness in letters or in science received at Paris a warm welcome and the fullest encouragement. The spirit he there implanted and so zealously fostered has grown, and borne in the years that have past abundant fruit. In Paris modern surgery was born, and at its birth the dental surgery we now know received its first educational impulse. It was, indeed, an auspicious time for a great mind to do the world a signal service when Ambrose Paré arrived at Paris, about 1525, to begin his wonderful career by an apprenticeship to a barber surgeon. At that time the occupation of barber and surgeon, and a little dentistry, was usually combined in one. He early evidenced a disposition to master the more important features of his art, and while still a young man his marked ability as a surgeon attracted the attention of Captain-General Rene de Monte Jean, commander of the French forces during the campaign in Piedmont in 1537, and he received from him a commission as Master Barber Surgeon. In this position he found opportunity and encouragement to introduce those reforms in surgical practice that have earned for him the well-merited title of the Father of Modern Surgery; and let me here add, he may as justly be styled the Foster-Father of Modern Dental Surgery. Compared with the dentistry of the present, the dentistry of his day, although crude, was far more advanced than was the general surgery of 1537 compared with that of 1895. He proposed to treat wounds with supporting bandages, control hemorrhage by ligatures, and assist nature with soothing applications in the place of the time-honored actual cautery and boiling oil. Contemptuously throwing aside his whole array of searing tools, he presented his brazier and oil pots to his cook for use as porringers, and entered upon his work armed only with bandages and a few simple emollients. This radical departure from the accepted creed of the times aroused a violent storm of indignation among his professional compeers ; but the results he obtained made his services in demand by the wounded and the suffering. Where he had charge, the restfulness and quiet was in marked contrast to the stench of burning human flesh and the cries of anguish,—time-honored accompaniments of the then accepted orthodox surgical methods, especially in army practice. To be waived aside, to see this unpretentious youngster, scarcely out of his apprenticeship, and his unheard-of methods preferred to theirs, was humiliation enough to those who clung with all the ardor of ethical fanaticism to time-honored customs ; but to see patients who would, after enduring hours of untold anguish under their strictly professional procedures, have been the subjects of a pretentious funeral, by this new departure, after a few weeks of recuperative rest, fully restored to health and vigor, was exasperating in the extreme ; and they were minded to make things "hot" for Ambrose Paré.

Returning to Paris, he at once, paying no heed to the ravings of his detractors, fully supported and receiving every encouragement from the court, vigorously set to work to reform surgical educational methods and practice. He insisted that surgeons should receive a medical training, be thoroughly instructed in anatomy by dissections, and well versed in all that pertains to the art, and he organized schools for instruction. He wrote a number of works in French upon surgery and surgical practice, touching also upon the practical part of dentistry. He lived to see his work appreciated, his methods generally adopted, and the science he loved placed fairly upon a scientific basis, and died in 1590, honored and respected by all. The work so well begun went steadily on, and toward the close of the seventeenth century the surgeon and the dentist had so far separated from and advanced beyond their former companion, the tonsorial artist, that they began to claim an equal standing with the profession of medicine, and after a vigorous struggle they gained their point. During this contest the dentist and the surgeon fought for their rights side by side, and at its conclusion, in France, the physician, surgeon, and dentist became professional brothers. There and then, possibly for the first time since the dark ages, dentistry assumed the place she has since held,—ever recognized and unchallenged,—a science among sciences. About the year 1700, persons destined for the profession of dentist were compelled, in France, to undergo a regular examination, the same as surgeons and physicians. From this time on, dentistry assumed, in France, an importance it had nowhere else on the globe. The dental profession attracted to its membership gentlemen medically educated, of broad culture and marked ability, and of the highest scientific attainments. Its progress was rapid. Dental writers and investigators increased in numbers, while their work acquired greater scientific value. We find articles upon dental science and practice freely published in the medical and scientific periodicals. In a word, the dental profession there stood shoulder to shoulder with the liberally learned professions of the day, and received with them equal recognition and appreciation. French dentistry occupied then a similar position to that assigned in later years to so-called "American Dentistry," a term it would be well for the dignity of our profession could we effectually efface from the record, with all the bombastic nonsense associated with it.

Dr. Franklin's mission to France proved a brilliant success. With all the adroitness of a born statesman, taking full advantage of the political surroundings, he secured from France that material and moral aid the struggling colonies so badly needed, and in a few years a new nation was born. Now, let us see how closely and yet strangely Dr. Franklin's success as a diplomat is connected with the history of dentistry in the United States.

With the land forces sent to our assistance by France was a young officer, Joseph Le Maire,* a dentist of Paris, who, following the example of many of his countrymen, abandoned for the time being his business and tendered his services to the cause of liberty. With the French fleet arrived James Gardette, a naval surgeon on his first cruise, a man whom we dentists of Philadelphia will ever hold in grateful remembrance. He did much to make dentistry in Philadelphia what it is. James Gardette was educated for the medical profession. When he resolved to enter the navy, as part of his profession as a naval surgeon he received instruction in dentistry from M. Le Roy de la Faudiniere, a distinguished dentist of Paris, and provided himself with dental text-books and instruments. This was required of naval surgeons in the French service in 1777. We have no reason to think that he contemplated the practice of dentistry when he left France other than as part of his work as a naval surgeon. He soon acquired a distaste for the sea, and resigned his position. During the winter of 1781–82, the war then being virtually over, the French and American armies were in winter quarters side by side near Providence, R. I. In that camp, relieved of the tension associated with active service† and expecting soon to resume civil life, we find, in intimate friendship, Joseph Le Maire, James Gardette, and Josiah Flagg. Le Maire had, now and again, to the great comfort and satisfaction of his companions, performed dental operations for their relief, and now many of the officers and others took advantage of the opportunity to secure his services. Josiah Flagg had been greatly interested in Le Maire's work, and proved an apt and zealous student. Gardette also embraced the opportunity of adding to his dental knowledge already gained. So you see it needs but little stretch of the imagination to locate the first school for dental instruction in the United States, and the first dental meeting for mutual improvement, around this Revolutionary camp fire. We may safely say that scientific dental surgery in the United States owes much of that which has given it its well-merited reputation to the good work there done in 1781–82.

Not only did those connected with the army have opportunity to observe and receive the benefits of skilled dental services, but the presence of the army in its then inactive condition attracted from all parts of the country many of our best citizens. When the army dis-banded, the merit and advantages of dental attention were made known far and wide, as they could have been so quickly by no other means. This created a demand, the return of peace and prosperity furnished the means, and we soon find dental practitioners in all parts of the land. Toward the close of the last century our profession in the United States was well established and fully appreciated.

---

* Sometimes by old writers spelled "Lemayeur." Toward the close of the last century, the French Academy simplified the spelling of many French words, dropping silent letters, etc. Le Maire changed the spelling of his name to conform to this.

† *American Journal of Dental Science*, vol. i, New Series, April, 1851, page 375.

I am not unmindful of the good and skillful men, native-born or from abroad, who by their example or their labor have done much to extend our professional knowledge, when I present to you these men as the Fathers of Scientific Dental Surgery in the United States, and so close this story of the advent of dental science in our midst.

HOW SHALL WE MAKE OUR LOCAL SOCIETIES MORE ATTRACTIVE AND HELPFUL?

BY F. MILTON SMITH, D.D.S., NEW YORK, N. Y.

(Abstract of paper read before the First District Dental Society, State of New York, March 10, 1896.)

In commercial matters, if a man has a manager who is successful in the management of his business, and has those under him who work harmoniously, he believes, and with reason, that he ought not often to make changes in the list of his employés unless it be to promote them to places for which their experience has qualified them.

This plan to my mind, with certain modifications, if followed in our society work would be productive of much good. My judgment is, that much force is wasted in many of our societies by electing the president for a single year, as also by entirely changing the list of committees each year. My impression is, that it is not possible for the president of a society to do his best work if he is elected for a single year. He is not supposed to have bestowed more thought upon the management of the society previous to his election than the average faithful member. Unless he be particularly apt in such matters, if he is a busy man,—and we want no other,—it will be six months before he can form his committees, make his plans, and begin to execute them. It is useless for him to plan for anything beyond his term, for the probability is the next incumbent could not use his plans. So it appears to me that about six months of each year are wasted.

There is some force in the claim that each president should appoint his executive committee, in order that it may work with him harmoniously; yet to me there is a strong objection in that upon each change of administration the members who were active during the out-going one are all laid aside and an entirely new set of men is substituted, many of them without previous experience. In most cases those retiring do not in any way assist the new administration. They might be helpful if they would, but except in rare cases they seem to settle back in their old places, and say to themselves, "Now we will see."

As to the term of executive committees. What has been said in regard to lengthening the term of president holds good with standing committees. At present, the several members being appointed at the same time for one year, enter their work at a great disadvantage, having no knowledge of what work the former committees leave unfinished, and possibly no one on the committee is at all acquainted with the kind of work before them. With them as with the president, nearly half their time must be consumed in learning the ropes, and almost as soon as they have hoisted sail they are commanded to cast anchor.

The experience they have gained is valuable, but we do not get the benefit of it. In other lines this is turned to good account. Take, for instance, our legislatures and Congress. It is a well-known fact that a representative, if good for anything, rarely ever does his best his first year, and if he conducts himself decently, his chances for election are better his second year than they were his first. Some one says, "Would you have the same men run the society indefinitely?"

By no means. My plan would be to have the committees composed of at least five members each; these to be elected by the society, one or two of which should be elected each year. It might possibly be well to make the man longest in office chairman. By this method, if the committee communicate with a man and find he will be glad to serve the society, either in a literary way or by giving a clinic, yet cannot do so during the current year, he can be posted on the books; and when he is ready, the opportunity is ready for him, instead of his work being lost to the society and possibly to the world.

Such a committee could keep a record of cases, following them up and publishing the success or failure of operations which may have been performed sufficiently long to judge of their merit. Under the present condition we know practically nothing as to the success or failure of an operation at a clinic.

I am not unmindful of the fact that some men characterize our clinics as "Kindergartens."

Judging from the character of work done by some, my impression is that it would have been far better if *they* had continued in the Kindergarten until they could more closely resemble their teachers in the character of the work turned out. Personally, although for twenty-two years I have been trying to come to that place where none could excel me in doing work for the salvation of teeth, yet the honest operator who cannot teach me something must be an exceedingly poor specimen. What I don't know about saving teeth would make quite a respectable volume.

Sometimes I have taken an afternoon that I could ill afford to attend a clinic, and in going from chair to chair have seemed to get nothing new, there being nothing novel in the operation, when my attention would be arrested by some slight *detail* in the operation which I before had not been able to easily overcome. The chief value of clinics to me has always been the slight difference in the details, rather than the *novelty* of the operation.

I suppose a majority of the profession do not believe that the immediate filling of all roots of teeth will average as few failures as the orthodox plan of treating day after day. I should like to see a contest in this direction, extending through several clinics, the cases to be carefully recorded and watched through two or three years. I will venture the opinion that as many roots will remain comfortable after immediate treatment as will after the orthodox, with a saving in the former of much valuable time. Could this be demonstrated, I am sure many would accept this method who now have no faith in it. Such contests would only be made valuable under the care of a committee which is practically continuous.

Another thought comes to me, and it is this : We do not use the individual members of societies sufficiently. Some one has said, "Men are only boys grown tall ; hearts don't change much after all." When we were boys we didn't train along with the crowd who gave us no work to do, and when we played a game of ball, kept us out in the right field or behind the catcher all the time. We wanted to count for something. That "a prophet is not without honor save in his own country" is forcibly demonstrated by the records of this society for the past three years. It would seem to me that this society having on its roll as resident members many of the best men in the profession, ought to have some in it capable of preparing as interesting and instructive papers as can be produced anywhere in the country. I would put it stronger, and say I believe we *have* men in our midst who can produce papers as good as any we have listened to during the past three years.

Some will be surprised to know that in the three years last past, only four or five New York men have delivered papers before this society, and if I mistake not, but three are members.

I think this condition obtains largely in all societies. Many of the papers we have listened to have been ably written, but a large number have been of such character as that they could not be intelligently discussed, and in many cases so lengthy as to consume all the time allotted to both paper and discussion. Some of these would have been better contributions for journals, where we might read them at our leisure and have time to grasp the thoughts of the writer. This with no disrespect to the writers, who have been almost without exception able men.

My impression is, if each society would seek to bring out the talent which is in its own membership (if you please, have two papers of ten or fifteen minutes each, with ample time for discussion), and only *occasionally* call on outside help, we would do better work.

If you have no papers except by men of the very highest rank, and many of these on subjects with which few are at all familiar, your papers will not be discussed. The average member of any local society does not care to assume that he is fully equal to discussing a paper which he has never heard before, and which some leading man has spent many weeks in preparing. Unless there shall be some one who does not carry his sensibilities close to the surface, and who is willing to "rush in where angels dare not tread," such papers will not be discussed. Possibly it might be well for the management to ask for short papers from the membership, and after examining them, if they shall come up to a fair standpoint, have them read by the writer before the society. This might encourage at least some of our younger men, who would not prepare and read a paper before us lest it might not be well received.

By this method they would know that the committee at least consider their paper one of merit, and would be encouraged to read it. This plan might bring out some valuable contributions that will not be gotten in any other way.

While I would not for a moment disparage scientific papers, I still think that we may be in danger of giving too much time to that at the expense of the mechanical or practical. For instance, while it is well to settle if we may the question, "Do coagulants prevent the diffusion of antiseptics in the treatment of pulpless teeth?" it seems to me just as well if some one knows of a plan whereby he can make such teeth comfortable for years with or without the use of coagulants, that we hear from him.

Another point which I desire to emphasize is that at every meeting ample time shall be given to incidents of office practice. I would encourage every member to keep a tablet in his office for the purpose of noting anything of interest that occurs to him out of the usual line, also anything perplexing, and bring it to the society. Very much may be gained by this, and yet it has been largely crowded out.

A suggestion in regard to the personal responsibility of members, and I am done. It is a lamentable fact that so few dentists in proportion to the whole number are members of any dental society. There are in this city many dentists who remain in their offices and read regularly the transactions of this and other societies, who actually owe their bread and butter to the few men who have faithfully supported the societies in the past.

Some of these watch the transactions of societies closely and appreciate everything practical that is brought out, yet are either too lazy or too selfish to make known to the profession any thought of value that may occur to them, and never have the courtesy to acknowledge their indebtedness to others. These could probably never be persuaded to join any society. There are many good men, however, who might be persuaded to identify themselves with society work if they were personally invited. All men are not blessed with the same amount of assurance. There being three or four men not connected with society work, one may possibly ask some one to propose him for membership, while the others—and they may be more desirable—remain outside because not invited to join us.

Too many of us I fear hold our membership in societies from selfish motives. We are like the man who joined the church, and his home life was not what it should have been. His boy was asked, "Is your father a Christian?" The answer was, "Yes; but he don't work much at it." The reason given by some for not joining our societies is that a certain few run the society and have everything to say as to its management. My reply is, "A certain few cannot run the society unless the majority consent to it." My thought is that the way to improve any society is not to refuse to attend its meetings, but to use our best efforts toward bringing a better condition to pass.

It is an accepted truth that "a chain is no stronger than its weakest link." This the deacon appreciated when he built his "wonderful one-hoss shay;" and this in a measure we must appreciate if we would have our society strong and vigorous. If we make no effort to raise ourselves socially, morally, or intellectually, above the plane where we stood when we commenced practice, but waste our time when not engaged in our offices by idle gossip and such reading as the Sunday and daily papers furnish, we shall not be of much use in the society of which we are members. I hold that if we would be strong, "all around" men, in our societies, we must mingle freely with intelligent people, read the best reading, and take a prominent part in the affairs of the world. I know it is sometimes said of an individual, "His life is entirely given up to his business." To my thought this is a doubtful compliment. If the whole of life is to "eat, drink, and be merry," and we have no mission that reaches beyond the gratification of our own appetite and passions, although having arrived only at the half-way station on the time-card of human life, I for one have had enough. Call up a man who has devoted himself exclusively to his business, making all his surroundings subordinate to his own personal interests, never engaging in any social, philanthropic, or religious work, except as means to secure patients to himself and dollars to his pocket, and see if your sympathies go out to him, or if you desire his society. I think not. I have an old-fashioned book at home that my mother used to read, and she was foolish enough to believe it. It contains a passage like this: "A man's life consisteth not in the abundance of the things that he possesses." In his ability to help those about him, to make the world brighter and happier, to bring people closer to the God who made them and cares for them, in this and this alone can we get real satisfaction out of life. Therefore, I say, let us embrace every opportunity that will improve our minds, broaden our thoughts, or in any way make us truer and better men, with the end in view of doing some good in the world, then shall we find it reflected back upon ourselves in the good work we shall be able to do in our dental societies.

CONCERNING VULCANITE.

BY DR. C. A. ALLEN, BUFFALO, N. Y.

(Read before the Second District Dental Society of the State of New York, March 11, 1895.)

THE physical changes which vulcanite undergoes during the process of its becoming a solid body, I think, are little understood. At any rate, the remedy for many of the evils of unscientific treatment is too rarely employed.

To begin with, let us briefly consider the elementary character of this body. The gum as it comes to the manufacturer is purely a vegetable compound,—a hydrocarbon,—made up of $H_{16}C_7$ (however, upon these proportions authorities differ, but not to the injury of our argument).

Sulfid of mercury, which renders the body of use in our art, is now added in the proportions of one to two of rubber. We now have a compound which, when properly treated, produces a uniformly dense and sufficiently strong base for our purposes.

Some of our high attenuationist friends of "little pill" fame, boldly declare red vulcanite plates to be the origin of all obscure physiological derangements, charging as they do that the coloring pigment is red oxid of mercury, which is highly irritating to mucous tissue. The absurdity of this charge is clearly manifest when it is stated, as a matter of fact, that our coloring pigment is simply sulfid of mercury. This preparation possesses no toxic or even disturbing physiological effects whatever, and may be brought into mucous contact with impunity.

Experimentation by thorough processes, aided by the most delicate instruments, has demonstrated that the quantity of mercury which it is possible to evaporate from a vulcanite plate, before actually destroying the body itself, is only infinitesimally small. It should be remembered that in order to have even this slight manifestation of the "enemy's" presence a high degree of heat must be attained, a condition which could not be sanely looked for in the human mouth.

In the process of vulcanization it is readily conceded that we first have fusion of the component parts of the body under treatment, which occurs at certain definite temperatures.

What are these points of fusion?

Any work on chemistry will place you right on the melting point of the sulfur in the mercury compound,—and that will be 237°+ F. As to the melting point of the hydrocarbon compound (rubber), elaborate experiments by Dr. A. P. Southwick prove, beyond the possibility of controversy, that this will be at 248° F.

Now, with the component parts of our body all fused, we may naturally expect the commencement of that remarkable and little understood physical change in the compound which *we* term vulcanization. That this change does begin at once upon the fusion of the compound's ingredients, and that vulcanization as we understand it may be fully completed without the addition of a single increment of heat, is easily demonstrated. All that possibly could be required in addition to the present conditions would be a continuation of the 248° to 250° F. over a longer period of time. If doubt exists in the mind of any one present as to the truth of this statement, let me suggest to him that he can easily obtain a "lazy man's proof" of it by asking any manufacturer of rubber garments how he treats the articles as to temperature, time, etc.

Continuing in my quotations of the authority mentioned, I fearlessly make the statement that the actual destruction of vulcanite begins at 300° F. and continues in proportion as the temperature is raised to 600° F°., where rubber will be entirely dissipated, the sulfur being affected in the same manner at 824° F.

Now a word in regard to vulcanizers and their use. It should always be borne in mind that the degree of heat indicated by the mercury bath thermometer *never* registers the degree of heat corresponding to that of the inside of the vulcanizing pot where the case is being treated. The figures for this statement are as follows: If the stratum of atmosphere inclosed in the pot above the water line (when the cap is adjusted) is not expelled upon a degree of heat sufficient to generate steam being reached, we can always confidently rely upon our thermometer registering from 15° to 18° F., according to the amount of water, below that actually existing within the chamber. Not only this, but we must always be prepared to take into account a considerable loss of registering power of the thermometer through the radiation of heat, the convection of air currents, temperature of room, etc. To these influences you can always safely charge a loss of registering power of the thermometer of at least 15° F., and usually more, often 20° F. If these figures can stand verification, and I declare that they can, what will be the result? Simply this: the man who does not expel the atmosphere from the pot really subjects his case to at least 30° F. of temperature more than that indicated by the thermometer. If he does expel the atmosphere he still has 15° F. more than that registered. From this point our deductions are easy. We have declared that the destruction of vulcanite begins at 300° F. actual. As an illustration of this point, let us imagine a case being treated at the old-fashioned 320° F. without regarding these two influences. The result is easy. Instead of 320° F. we have at least 350° F. If the stratum of atmosphere *is expelled* we still have 335° F. to which our case is being subjected. If these figures and those preceding them are correct, we find ourselves treating vulcanite anywhere from 50° F. down to 35° F. above where the destruction of the compound actually begins. We are now asked what will be the manifestations of this unscientific treatment of the most abused and least understood body in the dental world. Every child in the land associates with rubber the property of elasticity, and that to the degree of exceeding in this respect any other body known to him. Do the high-temperature plates retain this characteristic? By no means, and, on the contrary, they have entirely lost it. Why? Because the extreme temperature to which they have been subjected has destroyed this natural inherent characteristic.

The early workers of vulcanite will tell you that to-day we cannot produce a plate which can be constricted at the heels, as they "used to do," and thereupon see it return to its former relations. The reason for this is obvious. The pioneers in vulcanite were instructed to vulcanize at a low temperature, about 280° F. Besides this, the machines placed upon the market at that date were so constructed that the heat was carried up and redirected upon the pot, thereby losing but little by the convection of air currents and radiation. If this be true, we now have to account only for the loss of the registering power of the thermometer by virtue of the stratum of air left in the pot. We have stated this in degrees to be equal to 15° F. to 20° F. This reasoning will easily solve the true degree of heat to which the case was subjected, and at the same time demonstrate why that property of elasticity was not lost in the work of the vulcanite pioneers. The next manifest injury to the base for our purposes will be in its extreme contraction. It should be borne in mind that vulcanite is affected by thermal changes more than any other solid body. Its rate of expansion in ordinary temperatures is somewhat over six times that of iron, about five times that of brass, and nearly four times that of zinc. This extraordinary expansion upon the application of heat will conversely manifest itself by contraction when the opposite thermal condition is applied. How and where will this extreme contraction be manifest in dental plates? If your case be of the stupidly contrived "gum sections" it can express itself only at one point, namely, by a contraction at the "heels," and a consequent raising of the body from contact with the model, most manifest at the posterior part, but really extending itself well anteriorly. How can this be demonstrated? There is but one way. Preserve your model after vulcanization, and restore the plate to it, when the extreme degree of contraction will be only too manifest. The base will have no manner of contact at its posterior part with the model upon which it was vulcanized. This contraction in case of the use of "gum sections" with properly ground joints must necessarily be at the rear, as the arch cannot be crushed. In the use of "plain teeth" the contraction is diffused throughout the entire plate, and consequently does not appear so prominently at the point mentioned.

The question may be asked, "How can the model be preserved?" This is perfectly easy. As soon as the temperature is reduced to the proper point, open the flask, remove the denture from the model, and at once place the model over a gentle heat for a time sufficient to expel all moisture.

Another result of excessive temperature in vulcanization, and the inevitable contraction in the molecular rearrangement which will follow, may manifest in cracked sections or "chipped" joints.

Still another condition may present the case with one or more "spongy" points, usually to be expected at the thickest part of the body. The writer's deductions from the foregoing are that all bodies of vulcanite treated at a temperature above 300° F. (actual) will show—

1. Destruction, increasing proportionately with temperature elevation, and loss of elasticity.
2. Extreme contraction, resulting in the plate having no membraneous contact across the posterior part.
3. Broken or cracked sections, or "slivered" at joints.
4. Sponginess of vulcanite at thickest portions, which may be manifest over a considerable surface, or may appear only at certain points in size and shape quite like a split pea.

Remedy.—Any or all of the foregoing results may be obviated by maintaining a temperature within the vulcanizing pot throughout the entire period which shall not exceed 300° F.

GOLD FILLING, WITH SPECIAL POINTS FOR HAND PRESSURE.

BY A. D. BARKER, D.D.S., GRINNELL, IOWA.

(Read before the Iowa State Dental Society, Marshalltown, Iowa, May 6, 1896.)

THE common gold plugger may be defined as a piece of steel with the end cut off flat and grooved across both ways, or serrated. Whatever may be the size of this end or point, it is still a cross-cut flat surface.

To obtain the best results, the direction of all force applied to such an instrument must be at right angles to the plane of its surface. As an aid in this constant effort to bring the face of the plugger down square with the surface of the gold, we have the shanks bent so as to bring the faces at almost every conceivable angle to the handles. This multiplies the number of instruments beyond all reason. Besides, it is neither convenient nor possible to change instruments often enough to meet perfectly all the varying conditions of many cavities. Consequently we do the best we can with a more or less limited number of instruments, and are often filled with misgivings as to the adaptation of our gold. If one point does not suit, we try another, which is likely to be "equally successful." So I have suffered many things of many plugger points and was nothing bettered, but rather grew still more discontented.

In the mean time I was continually but vaguely longing to disregard the face of the plugger and to apply force to the gold, not in one direction only, but sidewise, cornerwise, and in any direction that occasion might require; to know that the gold was spreading right out against the walls of my retainers, or against the cavity-walls or margins anywhere.

About the first light that reached me on the subject came from Dr. Royce. He did much valuable work along this line, but his pluggers did not meet my requirements. I made my retainers mostly with round burs, and I wanted points that would make the gold fit them perfectly.

Finally a new view of the situation presented itself. After we have removed the decay and defined the margins in almost any tooth-cavity, what do we do? Simply take up the hand-piece with a bur of suitable size, and shape it so it will retain the gold. Now here is the point. If one straight instrument will shape the cavity, why should several crooked ones be required to fill it? Again, if the cavity is shaped with a round instrument—the bur—how can we expect to fill it perfectly with flat ones? After getting this far, obviously the query was, Why not fill the cavity with a plugger shaped exactly like the bur that shaped the cavity? With such a point the gold must of necessity fit the retainers. We can reach anywhere with it that we can with the bur. The sides of it will carry the gold perfectly into any undercut made by the side of the bur. One instrument takes the place of several. And as to the adaptation of the gold, it is accomplished, as I believe, to a degree of perfection rarely before attainable.

I have here ten instruments for your inspection, which more than satisfy the conditions named. The foregoing account of the evolution of the idea is given that you may the better see why I produced them. As to the manner of their development into the present form, it is perhaps unnecessary to speak. All of them are double-enders, made so because one point often follows the other in the same place, and it is easier to change ends than to change instruments.

The character of the points may be indicated by saying that they are simply flat, round, and ball burnishers, cut one way. This is true of all but two. One has both points smooth for final burnishing. The other has two flat burnishers, one being cut lengthwise and the other crosswise. Each of the others has a ball on one end and a plain round-ended burnisher on the other, all cut one way. The points on each end are the same size. One is made without the ball to prevent the gold from curling around it when being carried into a deep cavity.

Of these eight, four have a slight curve in the shanks, the other four a full curve. Each shape has four sizes, marked by one, two, three, and four lines around the handle, according as the points are respectively slightly under the size of the Nos. ½, 1, 2, and 3 round burs. All of these may be used with simply pressure, or with a steady rub lengthwise of the serrations. What satisfaction I have taken in rubbing the gold right down over the cervical and oral margins! I have never been able to convince myself that firm pressure with the hand was not the surest way to adapt gold to any surface. I do not think there is sufficient time on the instant of receiving a blow for the particles to slide past each other properly. As you know, gold spreads better under a round point than any other, and in the one way serrations we have a series of wedges forcing it together. For filling the inclosed point of any tooth-cavity, I believe nothing can equal such points as these, after their use is learned. When the filling has become flat, or nearly so, any preferred method may be used.

Now we come to the most noticeable feature of the instruments, the large handles, and another very important one, the short shanks. The latter bring one close to the work, and the former give a firm grip, without tiring the hand. Both are copied direct from Dr. Libby, and are most valuable, as is also the building up of gold by rubbing or burnishing, although I find it too difficult to use smooth burnishers, as he does.

While it is possible to fill any tooth-cavity that can be shaped with the straight hand-piece with these points in a straight handle, I find it usually more convenient to have a slight curve in the shank, and sometimes even the full curve. Those with the full curve are certainly all that is necessary for use after the right-angle hand-piece.

Unless you are entirely satisfied with present methods, I wish to be very emphatic in recommending not only these points, but the complete instruments to your careful consideration. While no one should hesitate at any time to make use of any other plugger, if it seems desirable, I have found myself recurring less and less to the old forms as I learned to use the new, and to appreciate the advantages of the principles involved.

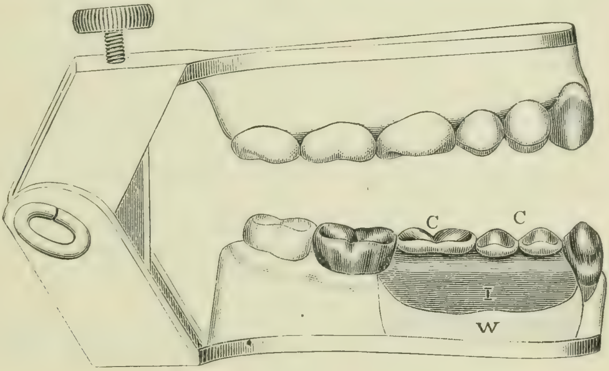
A NEW DEVICE IN CROWN- AND BRIDGE-WORK.

BY HARRY C. SPENCER, CHELSEA, MASS.

THE following method in crown- and bridge-work embraces certain new features which I think will be found advantageous to the experienced practitioner, while to the student and dentist of limited experience it will be of special value, being simple, accurate, and practically free from additional expense.

In this method an assortment of bicuspid and molar cusps is the important factor. These should be shell cusps (not solid), and may be made by taking impressions of natural teeth in moldine, running metal dies, and striking up in the ordinary way, using for the cusps aluminum or any metal which the operator may prefer. The usefulness of these cusps in bridge-work will be made apparent by referring to the accompanying illustration. This shows the lingual surface, the second molar and cuspid being gold crowned, and the space between occupied by a molar and two bicuspid facings—already backed. The wax is represented by *w*.

Impression compound is now warmed and placed over the wax. A cusp corresponding in width to the molar facing and in form to articulate with the occluding tooth above is selected from the assortment, placed in position on the soft compound, the articulator closed together, and the cusp forced into position (*c*, cusp in position ; *i*, impression compound). The bicuspids are now treated in the same manner. If the compound has become hard in the mean time, simply warm the cusps. The metallic cusps are now removed, which may be easily done if the compound has been previously coated with French chalk or vaseline. This brings to view perfectly formed cusps in impression compound, from which, after it has become hard, an impression is taken in moldine as they stand on the model, a metal die run, and the three cusps struck up in one piece out of gold. These gold cusps are now placed on the model, occupying the same position as the trial cusps which were removed. It may thus be readily seen that if the gold cusps are made the same gauge as the trial cusps, a perfect articulation is assured, the thickness of the gauge of gold even, not intervening, the gold cusps having simply replaced the trial cusps. While (for the sake of illustration), if it were desirable to prevent the molar shown in the illustration from occluding with the tooth above, leaving only the bicuspids to act, a thicker trial cusp (say 28 gauge) might be used for the molar and 30 gauge for the bicuspids, the whole being replaced by 30 gauge gold cusps, which would leave the molar a trifle shorter (the difference between 28 and 30 gauge). The whole bridge, after being properly waxed, is removed, invested, and soldered as usual, the work being accomplished artistically as well as quickly and accurately.



In crown-work this method may be used in the mouth or on the model. The band is made as usual and put on the tooth. The occluding end being filled with soft impression compound, a cusp is selected to suit the case, pressed into the compound, and adjusted to articulate perfectly with the occluding tooth. It is then removed, the compound trimmed around the edge of the band if necessary, an impression is taken in moldine, a metal die run, and a cap struck up and soldered as usual.

Absolute accuracy of the trial cusp as to size is not a necessity, for if it be too large the cusp which it has formed in compound may be trimmed to remedy the deficiency, while, if necessary, the form of the trial cusp itself may be altered.

For cusps aluminum works quite well, although any malleable metal may be used to advantage.

In making these cusps, extracted teeth may be used to form the dies, their decayed portion being first restored by compound ; while if the tooth be first slightly coated with vaseline before taking the impression in moldine, the metal die formed will be more clearly defined. This also applies to the female die (if one be used), if the male die is first coated.

STOMATITIS THE CAUSE OF VARIOUS THROAT-DISEASES.

BY ISIDORE LETT, D.D.S., PHILADELPHIA, PA.

It is more fully recognized every day that dentistry, although a science in itself, is an important branch of medicine, and that it is necessary for us to co-operate with general practitioners. In support of this assertion, I have had several cases which I will describe.

I have noticed repeatedly when a patient has acute stomatitis that the throat will invariably remain unaffected ; but when this acute condition develops into a chronic state, the throat will be affected by the inflammation extending down along the mucous membrane, attacking the tonsils, resulting in tonsillitis, the most common seat of attack, or even advancing to and embracing the pharynx or larynx.

Now, how far should a dentist pursue his treatment? Although he may be able to treat tonsillitis, it surely is not more permissible for him to do so than for a physician to treat an alveolar abscess, the result of a putrescent pulp.

I have noticed in tonsillitis, the result of chronic stomatitis, that a cure can be effected by successfully treating the stomatitis, or sometimes it may take one or more local applications on the tonsils. It does not require any length of treatment.

By not treating the stomatitis, the inflammation, if expressed by tonsillitis, pharyngitis, laryngitis, etc., will demand persistent treatment.

Case 1.—Stomatitis, the result of salivary calculus. Inflammation extending down to tonsils, causing acute tonsillitis.

By removal of the tartar the stomatitis was cured ; this was followed by disappearance of tonsillitis.

Case 2.—Patient single, aged about twenty-three years, presented herself with stomatitis, the result of a very painful alveolar abscess, caused by the roots of a superior third molar.

Previous history.—Always a sufferer from tonsillitis, laryngitis, etc. Tonsil glands removed about eight months previous to this attack Before abscess manifested itself, patient's throat was in good condition. When this abscess started, which caused a severe stomatitis, patient remarked that the inflammation seemed as though it was extending down into the throat. On the next visit, patient had same old complicated trouble, which would not have occurred had this abscess not developed.

Case 3.—Lady, married, aged about twenty-four years. Stomatitis, the result of an erupting inferior right third molar. Patient noticed soreness over the locality of the erupting tooth. Tonsillitis was present. Was treated for this by a physician, without any good results Patient presented herself to me in above stated condition. I immediately lanced over erupting tooth. As an experiment, and not to intrude on a physician's right, I made an application of tannic acid with glycerol to the tonsils. The next day patient could talk and swallow, and in a few days was perfectly well.

CORRESPONDENCE.

CATAPHORESIS.

SAN JOSÉ, CALIFORNIA, July 25, 1896.

TO THE EDITOR OF THE DENTAL COSMOS :

Sir,—In view of the many discoverers of cataphoresis, or, more properly speaking, electrolytic obtunding of sensitive dentine, I wish to call the attention of the dental profession to the following extract from a paper that I read before the Minnesota State Dental Society at their annual meeting in 1888, also read at the Southern Minnesota District Society at their semi-annual meeting in fall of 1888, and also read at the twenty-fifth annual meeting of the Chicago Dental Club, held in the Grand Pacific, on February 5, 6, and 7, 1889, by the secretary of that club in view of my enforced absence. The transactions of that meeting, in which the article appears, were published in the February number of the *Dental Review ;* subsequently they were published in book form, and each member and all visiting members were furnished with a copy. This article appears on page 113 of these transactions :

"This method that we shall present to you at this meeting to gain insensibility in teeth is the following :

"To a twelve per cent. solution of cocain add an equal amount of absolute alcohol, making a six per cent. solution of cocain in alcohol. In connection with this I use the galvanic current, varying the power as the needs of each case may indicate. The method of application is as follows :

"First apply the rubber-dam ; wet a pledget of cotton in the solution, placing it in the cavity of the tooth, pressing the point of the positive pole on to the cotton and the negative pole, with sponge attachment thoroughly wet, to the cheek, turning on the current. Rarely will more than four cells be necessary, if the battery is in good working order.

"An application of three minutes, with an interval of three minutes, and then another three-minute application, are sufficient in the majority of cases, although I have to occasionally make the third application, then dry the cavity thoroughly and commence excavating. My deductions as to the physiological effects are as follows : The galvanic current acts as a vehicle for conducting the medicinal agents ; the cocain anesthetizes the odontoblastic cells and the pulp ; the styptic properties of the alcohol act upon the dentinal fibrils, they being of an albuminous nature, causing contraction and increased density and firmness.

"My reasons for drawing these conclusions are these :

"I have found that the most sensitive teeth can be obtunded ; that after a certain period of rest sensitiveness returns, but never to that degree that existed before the application of the obtundent. Therefore, I conclude that a certain change has taken place in the dentinal fibrils, which I maintain is due to the styptic properties of the alcohol and not to the electrolytic action of the galvanic current. Another reason is, that a tooth in which the pulp is devitalized is a non-conductor of the electric current. A tooth which had been extracted was subjected to a twelve-cell current of a freshly charged battery, and proved an absolute non-conductor.

"In the treatment of peridental inflammation we have to use a stronger current, for this reason : It is well known that a strong current will tetanize the vessels, causing a diminished flow of blood to the parts, thus lessening congestion. The same current longer continued will cause electrolytic decomposition. These are laws of galvanic electricity that are incontrovertible. The medicinal agents that I use in all cases of peridental inflammation and the blind abscess are the following :

"A saturated solution of chlorid of sodium, seven ounces, tincture of ergot, one ounce. In the chlorid of sodium we have one of the constituents of the blood, where it keeps the fibrin and albumen in solution. The tissues in an inflamed condition lack this element, which we supply artificially. In the tincture of ergot we have a drug that stimulates contraction of the blood-vessels, causing anemia. Taken together we have here a combination which decreases the flow of blood, reducing congestion, at the same time furnishing an element which is lacking and upon the presence of which normal conditions depend.

"The treatment of blind abscess requires stronger battery power, in order that we may get the full benefit of electrolysis.

"Dr. Weeks informs me that he has had remarkable success in using this method in removing pulps. My experience in this line has been exceedingly limited, having used it in only two cases. The first was partially successful, and the second was a complete success. The failure of the first I attributed to the congested condition of the pulp. I would recommend getting the pulp in a healthy condition first, as I find that in cases where we have an inflamed condition the full anesthetic effects are not as easily gained as where the pulp is normal."

Professor Weeks, of the Dental Department of the University of Minnesota, read a very interesting article on this subject at this same meeting, as we were working on the same lines, his attention having been called to the subject by the paper I read at the meeting in the summer of 1888. The subject was discussed at some length by Drs. Custer, Atkinson, Thompson, Harlan, Baldwin, and Taft.

The difference in my present method is to make the current constant from nine to fifteen minutes, as the needs of the case may suggest. The formula is one that any dentist can compound, and any good galvanic battery of twelve cells will do the work. The matter was given to the dental profession of the world through the medium of the Minnesota State Dental Society.

Very respectfully, D. F. McGraw.

◆

PROCEEDINGS OF SOCIETIES.

AMERICAN MEDICAL ASSOCIATION—SECTION ON DENTAL AND ORAL SURGERY.

(Concluded from page 679.)

THIRD DAY—*Morning Session.*

The Section was called to order at 9.30, and the secretary, in the absence of the author, read a paper by Dr. W. X. Sudduth, of which an abstract follows:

MODERN METHODS OF TREATING THE MAXILLARY AND OTHER SINUSES OF THE CRANIUM.

The diseases to which the sinuses of the head are liable are many. The most common, however, are empyema, tumors, and necrosis of the walls from syphilis,—mentioned in the order of their importance and frequency of occurrence.

Empyema antri is a suppurative condition, and arises in a large portion of cases from infection through dental abscesses, although the records show a considerable number of cases that can be traced to the extension of disease from the nasal cavity. The local inflammation may arise from occlusion of the osteum maxillare by polypi or inflammation, and decomposition of the retained secretion of the cavity-walls. The most common cause of obstruction of the natural outlets of the antri are nasal polypi situated around the opening.

In chronic empyematous conditions of the antral cavity the lining membrane is generally found to be thickened and spongy in character, the caliber of the cavity in some cases being considerably reduced thereby. In not a few cases necrosis of the bony walls results from the internal disease.

More or less intense neuralgias, following the course of the nerve-supply, together with sympathetic affections of the eye, are found. These conditions are generally unilateral, as empyema of the antrum is seldom bilateral.

Where obstruction of the natural outlet exists, there is a greater or less accumulation of matter within the cavity, with consequent pressure upon contiguous parts. In some instances where the empyematous condition becomes chronic, necrosis of the osseous walls, most commonly on the nasal side, results, and a copious discharge occurs into the nasal cavity.

In other instances the frontal sinus of the same side becomes involved, as also do the sphenoidal sinuses, accompanied by marked supra-orbital neuralgia.

In empyema antri without closure of the osteum maxillare, the symptoms are somewhat different. There is a more or less constant discharge of pus from the affected side, especially when the patients lie upon the opposite side, a position seldom assumed because the discharge annoys them to such an extent that they cannot sleep. As a result of the constant discharge of pus into the throat, more or less interference of the general health follows Dyspepsia and poisoning of the whole system results, which many times is indicated by a decided cachexia, especially indicated by the yellow appearance of the conjunctiva.

The diagnosis may also be established by exclusion, beginning with the maxillary sinus. The simplest method is that of tapping with a curved hypodermic needle through the nasal membrane, making the puncture in the inferior or middle meatus, and directing the point of the needle backward and downward. If there is pus present it may be accurately ascertained by such means.

Not every case of empyema antri should be opened into, and great care should be used in making a diagnosis.

Transillumination has been advocated by some, but has failed in the hands of even the most expert specialists when put into actual practice. I have used it in several cases, but with indifferent success. In one case it was used before tapping and drawing off a considerable quantity of pus, and then again afterward, but no noticeable difference in the appearance could be observed.

The one remaining condition to be differentiated from suppuration of the antrum is fetid ozena. Rhinoscopic examination will in all cases establish the differential diagnosis.

The greatest difficulty in the diagnosis is found where complications arise by reason of several of the cavities being diseased at the same time. These cases do not come to the dental practitioner for treatment as often as they pass into the hands of the nose and throat specialists. Empyematous conditions of the antrum are most generally of a purulent nature from the start, by reason of the fact that the cause generally lies in the discharge of a collection of pus from an alveolar abscess into the antrum.

Treatment of these cases is best directed from within the oral cavity, although the same methods may be adopted of introducing a tube through the nasal septum as before described. This is preferable to sacrificing a fairly good tooth, or even trephining the outer plate in the region of the canine fossa. The latter should invariably be done if the patient, for cosmetic reasons, objects to having the tube exposed upon the face, for if it is introduced through the outer plate it may be entirely concealed within the mouth.

After placing the tube, the antrum should be again washed out thoroughly with a biborate of soda solution, the fluid to be introduced through the tube and allowed to flow out through the natural opening into the nasal cavity, the patient being instructed to incline the head forward. If the opening is found to be closed or too small to permit the fluid, on which the pus freely floats, to pass out, then a freer opening should be made. After the cavity has been thoroughly cleansed by the soda solution, then a three per cent. pyrozone solution should be introduced and permitted sufficient time to disintegrate the remaining pus, if any, after which, as a final dressing, some bland antiseptic, such as well-diluted listerine, should be thrown into the cavity, and allowed to remain.

In like manner tubes may be inserted into all the cavities of the cranium, and the cavities should be washed out twice, and sometimes three times, a day. By aid of the tube this may be done by the patient himself or some member of the family, and the case need not be seen by the practitioner more than twice or three times a week.

If there is any odor at the second sitting, permanganate of potash should be substituted for the listerine for a few days. As soon as the quantity of pus becomes lessened a stimulating antiseptic should be substituted, than which I do not know any better than sozo-iodol and its compounds: sozo-iodol and bismuth in acute cases, sozo-iodol and mercury for sub-acute cases, and sozo-iodol and zinc for chronic cases. These should be used in the strength of about one-half grain to the ounce of distilled water. All solutions should be warmed before using, including the H_2O_2, which may be done by setting the vessel in which the fluid is held in a dish of hot water.

If neuralgia follows the washing out process, it is generally indicative that the astringent solution is too strong.

Discussion.

Dr. R. R. ANDREWS, of Cambridge, Mass., said that transillumination as usually attempted failed to show antral trouble because the light was not sufficiently brilliant. To make such examinations he used an eight-candle-power lamp, and in every case, some fifteen or more, it had plainly shown the presence of the disease. Where there was no pus the light penetrated the tissues, but the presence of pus obscured it. The difficulty with so powerful a lamp was from the heat generated, but this could be overcome by turning on the electricity after it was in the mouth and withdrawing the lamp as soon as it became hot.

Dr. G. V. I. Brown, of Duluth, Minn., did not think so well of drainage by means of a tube as the author did, as the tube would necessarily extend some distance above the floor of the antrum, and there will be a space below the level of the top of the projecting tube which will not be drained, nor did he think it was well to leave the fluid in the antrum to be drained out through the nose. He thought it was best to have the patient always lie down till the drainage of the antrum was complete.

Dr. E. S. Talbot, of Chicago, questioned whether antral troubles were generally due to abscesses from the teeth. Most of the cases he had met with were in people of a neurotic and degenerate condition. Such people are peculiarly subject to these diseases, which generally result from irritation of the nasal mucous membrane, and are more frequently found in climates where severe colds are prevalent from storms, blizzards, and extreme low temperatures. He finds the best place to enter the antrum for treatment is upon the external face of the canine fossa. In degenerate individuals, the antral cavities are very frequently deformed. In some cases they are entirely obliterated on one side, and much increased in size on the other. Sometimes the nasal cavity extends over to one side, and in one case, in trying to open into the antrum, he drilled into the floor of the nose.

Frequently there are septa extending across the antrum, sometimes dividing the cavity almost entirely, making it difficult to drain the cavity except you have the patient lie forward with the head down. He generally favored the treatment described in the paper, and thought the placing of the plug in the tube to prevent the ingress of air and saliva a very useful precaution, as unless the wound is kept in an aseptic condition it cannot heal.

Dr. Brown said that wounds in the mouth, in spite of the fact that it was practically impossible to keep them aseptic, healed much more readily than in any other part of the body. He accounts for this by the fact that the circulation of the blood is so free that septic conditions are neutralized.

Discussion was closed, and Dr. G. V. I. Brown, of Duluth, Minn., read a paper entitled

Disinfection of the Mouth a Potent Factor in the Treatment of La Grippe.

In my capacity as a dentist, through dispensary and hospital practice incident to the study of general medicine, and by consultation with physicians in regular practice who were particularly alive to the importance of the oral cavity in its relation to other disturbances, several conclusions have been borne upon my mind, which it is my desire to make the basis of this discussion.

First. That the disinfection of the oral cavity ought to be, and would be, if the necessity of it were sufficiently understood, as much a part of preliminary treatment of many diseases as the administration of a cathartic.

Second. What is wanted to bring the dentist and the medical practitioner more frequently into consultation, as they ought to be, is not so much reports of remarkable cases, which, while they call attention to the possibilities of trouble, do not give an adequate idea of the frequency of mouth-excitants of disease; not so much a theoretical digest of pathological and bacteriological processes, for, given the state of things as they exist, the physician can supply all this for himself; but a plain statement of the facts of individual observation and experience as applied in relation to particular diseases. I desire to call attention to influenza, or la grippe, as commonly called, in its relation to the pathological conditions of the mouth.

For fifty years this affliction has been recognized in periodical outbreaks, yet much of its real nature is still shrouded in mystery. We find, with some variation among authors, its description briefly to be as follows:

Definition: An acute, specific, infectious disease, characterized by great prostration, and often catarrh of the mucous membranes, particularly the respiratory and gastro-intestinal tracts, with marked liability to complications.

Etiology: Comparatively unknown, notwithstanding exhaustive literature on the subject; believed to be due to the infection of the body by a specific organism, though bacterial examinations have usually shown pus-organisms and diplococcus pneumoniæ to be present. Symptoms are those of a marked infectious, or toxic, general constitutional disturbance of the body, with local lesions and symptoms,—fever, languor, pain in the back, head, eyeballs, bronchial disturbances, or catarrhal affections of the digestive tract, with perhaps nausea, vomiting, diarrhea, etc., usually great depression of nerve-force and spirits, and a tendency to painful neuralgias of the trigeminus.

Complications and sequelæ are the really formidable part, and due for the most part to secondary infection, manifesting themselves in a variety of ways.

Diagnosis: Not usually supposed to be difficult unless in a form resembling typhoid in its early stages, but differentiated later by pain in the muscles and catarrhal symptoms.

Prognosis: Favorable in healthy patients, dangerous in heart-troubles and pulmonary diseases, or chronic nervous patients.

Treatment: Symptomatic, almost entirely; phenacetin, antipyrin, quinin, strychnin, and stimulants with morphia, when required, and good general care are the remedies most usually employed, with of course the usual variation of special advocates of other drugs. Thus we see from the clinical picture before us a disease, the characteristics of which are exactly those one ought to expect from quite common conditions of the teeth and gums, which, by reason of the constant discharge of pus, must, and undoubtedly do, aggravate the symptoms.

In abscessed teeth, caries and necrosis of the jaws, as well as in pyorrhea alveolaris, we have the danger of direct infection, of resorption of waste products, of toxic poisoning, and the constant passage of the pus-germs through the alimentary canal along the mucous membrane surfaces, ready to ignite inflammatory or catarrhal processes wherever the lowered vitality of the part offers the least resistance. I do not think it an over-estimate to say that ninety per cent., if indeed not all, patients would have some pathological oral condition, and yet a research of medical literature gives us almost nothing in regard to direct medication applied for the purpose of disinfecting the entrance portal of the infection.

We note the two most common forms to be bronchitis, with its serious complication, pneumonia, and catarrhal disturbances of the digestive tract.

Miller, in his "Micro-Organisms of the Human Mouth," referring to the experiments of Fränkel and Weichselbaum, who hold that the coccus of sputum septicæmia is to be regarded as the most frequent, if not the sole excitant of the lobar pneumonia, says, "If their view be correct, we may answer that in at least many cases the infection came from the mouth. The oral cavity serves as a gathering point for this microbe, which from time to time is carried into the lungs with the air, until at last, at some weak point, or as the result of some slight inflammatory action in the lungs, through which the power of resistance is impaired, it obtains a foothold in the lungs themselves. For this reason, therefore, among many others, the neglected oral cavity offers a dangerous source of infection, which has by no means received the attention it deserves."

Mouth bacteria as excitants of nasal and pharyngeal troubles are too well understood to need more than passing notice, and the same will, I think, apply to diseased conditions of the stomach, both catarrhal and digestive, which, over and over again, have been found to be the direct result of mouth conditions.

The other symptoms and sequelæ of this disease are simply such as might be expected from any toxemic poison affecting the system from infection, varying according to the virulence and power of resistance of the individual case.

It is by no means intended to convey the idea that la grippe is purely and simply a result of oral infection, though, as we not unreasonably suppose, the secretions of the mouth are often a culture media for its specific organism ; but there can be no doubt that many complaints arising solely from mouth disturbances are incorrectly diagnosed as la grippe, and that in such cases, as well as in the disease itself, much comfort, relief, and benefit might be given the patient during its progress, beside which many of the most serious complications might also be averted by the prompt, thorough, and continued disinfection of the mouth, meaning thereby, of course, not only sterilization of the buccal secretions, but treatment or removal of any diseased condition that may exist.

It has happened repeatedly in my practice that patients have come complaining of all the marked symptoms of la grippe, perhaps while under the care of a physician for its treatment, with a foul odor from the breath, the mucous membrane of the tongue coated, more or less pharyngitis, and upon examination I have found a copious discharge of pus from the necks of the teeth, discharges from the fistulæ of apical abscesses or necrosis of the jaws ; and by a removal so far as possible of the exciting cause, thorough cleansing of the teeth and medication in the form of sterilizing agents, aided by an antiseptic prescription to use as a mouth-wash every hour the first day or two, and three times daily thereafter, have been given marked relief and shown improvement within twenty-four hours, with apparently complete recovery in a very short time.

One such had suffered from recurrent attacks, accompanied by chronic sore throat, a severe bronchitis, hacking cough, and asthmatic attacks of considerable severity. All symptoms were, of course, marked, particularly the nervous depression and hopelessness.

Examination showed a chronic catarrhal state of nasal and pharyngeal cavities, with nasal polypus of considerable size. The oral cavity showed all the teeth more or less elongated, some having been lost, and on the right side the outer wall of the superior maxillary was bulged out sufficiently to give a distorted appearance to the face. As a preliminary step the care of the mouth was begun, it being understood that the polypus was to be removed and the treatment for the nose, throat, and bronchials was to be taken up later.

Incision was made through the thin, bony covering of what appeared to be a sinus filled with thin, light-colored fluid (though not connected with the antrum) ; but in washing out the cavity with hydrogen dioxid, bubbles were seen to ooze out around the neck of the right superior first bicuspid, and proved in fact that though the pulp of the tooth was alive, a pyorrhea pocket communicated with and had actually caused this apparently serious condition. Thorough local disinfection, draining and cleansing of the necks of the teeth, care of the pyorrhea by correcting malocclusion—an active exciting cause in this instance—and general disinfection of the mouth, repeated in the office daily for a number of days, augmented by a prescription for use at home, made such a general improvement in the patient that there was a general abatement of all the unpleasant symptoms, the despondency disappeared as she was able to go about and do her own housework, and the other treatment was considered unnecessary.

Another, a young man, having all the symptoms of disordered digestion, foul mouth, coated tongue, and troublesome, but not severe pharyngitis, loss of appetite, intestinal disturbances, pains in his head and all over body very marked, pulse irregular, one or two degrees of fever, for which, curiously enough, his physician had been content with administering phenacitin, a depressant, to still further decrease the already weakened and depressed condition,—treatment, according to good authority, that has probably killed, during the epidemic of 1889 and 1890, more patients than ever the disease alone would have done, was given the same treatment as in the preceding case, viz : Thorough disinfection of the mouth, in which not only was pyorrhea of long standing encountered, but some abscessed teeth and necrosis, for which it was necessary to remove a sequestrum of bone. Immediate relief was given. Three days without the administration of drugs were sufficient to put him quite on his feet again.

These two cases are typical of the principal forms of this disease, and illustrate as fully as could be done by a rehearsal of many similar cases that have come within my notice.

In using the term "disinfection," I have included the operative measures necessary to accomplish the desired end, as well as the use of antiseptics. The former, of course, usually requires the assistance of a dentist ; but the latter is quite within the reach of every practitioner of medicine, who, if as he looks at the tongue in the truly orthodox manner of physical diagnosis, will glance at its surroundings and give, along with the prescription for internal use, one for a simple mouth-wash with good germicidal properties, will certainly find the usual remedies unusually efficacious.

Dr. Kirk, in the DENTAL COSMOS of November, 1895, speaks quite strongly upon this subject, and recommends the use of phenol sodique, adding the somewhat unusual procedure of holding the tongue and scrubbing its surface with a brush, to cleanse off the closely adherent furred coating. This I have not tried, though for a thorough cleansing it speaks for itself. I begin—as is my custom with every case presenting in which the suppuration processes are apparent—by making the patient rinse the mouth with a solution of mercuric bichlorid 1-1000, with an equal amount of hydrogen dioxid, or, in place of this, a strong carbolized solution, and continue the process two or three minutes by the watch. This serves the purpose of safety both to the patient and the operator. The local applications are of course governed by the nature of the case, and upon dismissing the patient I give the following prescription, which I have used a long time, and once before given before this Section :

℞—Listerin ;
Glycerol ;
Carbolic acid.—M.

Sig.—Dilute one teaspoonful in one-third glass of water. Use as mouthwash.

This seems to be quite effective, and is satisfactory because, by reason of its simplicity, patients being familiar with the drugs, are able to use judgment in varying the strength, as necessity may require.

There are, of course, mouth-washes galore, and I have no especial desire to go into the matter of their discussion. They must be strong enough to at least inhibit, if not destroy, the pathogenic organism, must be used constantly, and held in the mouth for several minutes consecutively, to be at all certain of effecting the desired purpose. As for other desirable qualities, these may undoubtedly be left to individual preference.

One of the sequelæ mentioned is affection of the trigeminus, and what is true of influenza is undoubtedly also true of many diseases, and if alone the practice of disinfecting the mouths of their patients could be freely established among those who visit the bedside, I am sure far-reaching benefit would result.

There was no discussion, and a paper by Dr. H. W. GILLETT, of Newport, R. I., was read by the secretary.

Dr. Gillett's paper, the title of which was "Cataphoresis," gave a résumé of the work done in this line up to date, most, if not all, of which has already been published in the pages of the DENTAL COSMOS and the *International Dental Journal.*

Dr. R. R. ANDREWS spoke of experiments of Dr. Gillett's which he had witnessed in which the obtunding of exceedingly sensitive dentine had been entirely successful.

Dr. J. H. BOOZER, of Atlanta, asked if there was any certain knowledge of the contents of the dentinal tubuli, whether it was known if the contents were nerve fibrils or fluid? In case the latter is true, there would only be two ways in which the sensitiveness could be destroyed, either by driving the fluid away or by coagulating it.

Dr. ANDREWS said there is no such thing as tubuli in dentine. What constitutes the tube is a part of the matrix which has not been filled by calcification; these are canals, and they contain vital fibers.

Dr. BOOZER asked at what point is the pain in a sensitive tooth,—whether it is in the nerve, or at the point where the dentine is touched by the instrument.

Dr. ANDREWS said he was not sure whether it was caused by the fiber or the fluid that enveloped it.

Dr. BOOZER said that at death the fiber would coagulate, then it would take the stain of the chlorid of gold, and so show under the microscope, and that this was all that is known of it. Black says it is a formative organ, and never changes till death. This is the fiber theory as accepted. In his opinion it is a specious theory, but not true.

Dr. ANDREWS said that nothing had ever done more harm to the cause of scientific dentistry than the publication of the work of Heitzmann, Bödecker, and their school. It is all wrong from beginning to end, and very misleading. In regard to the location of pain in a sensitive tooth, you cannot depend upon the feeling of the patient, who will always think you are in contact with the nerve, and if you touch another sensitive spot will think you are still at the same place.

Dr. BOOZER asked what was the method of nutrition of the tooth and the enamel.

Dr. ANDREWS said there was no circulation, nor nutrition, nor organic tissue in the enamel. This is one of the things that Heitzmann has misled us about. All the greater investigators have been over the field carefully, and failed to find any indication of such nutrition or circulation.

Dr. BOOZER asked if there was any repair in the dentine.

Dr. ANDREWS said there was in the case of young and healthy people a recalcification.

Dr. BROWN thought there was danger in too much effort to do away with pain in excavating. He considered the presence of pain as a warning against danger, and if we destroy the pain we may cause future trouble. Many times trouble comes from teeth which have been filled and seem to be all right, but when they are opened up they prove the cause of neuralgia or other troubles. In relieving the pain from the sensitive tooth and then operating, you may bring about a pathological condition which will cause trouble; this is especially liable to occur in a neurotic patient.

The subject was passed, and a paper by Dr. VIDA A. LATHAM, of Chicago, Ill., was read by title, the author not being present. Following is an abstract:

THE TECHNIQUE AND PATHOLOGY OF THE PERIDENTAL MEMBRANE.

The title of this paper is perhaps misleading, in so far as it seems to imply that new ideas are to be brought out, and that comprehensive work has been done on the subject. I wish to state that only a few brief ideas are here presented, and more particularly in the hope that some better results may be elicited.

So far as I can find by consulting text-books on micro-technique, little or nothing is said of technique in dentistry. A few ideas are scattered here and there through our journals. Works on dentistry dismiss, in a few lines, the peridental membrane and its structure, position, and the modes of obtaining sections for study. When looking over some mounts of teeth, I was surprised at the different appearances presented by them, some showing extensive pathologic features, and some interesting questions. To obtain normal peridental membrane is not easy. Some authorities claim it is found on all extracted teeth, while others say it is not present unless some pathologic process exists. Certainly in the majority of healthy teeth, after extraction, the roots are always free from any tissue, or what might be taken for periosteal tissue. In carious teeth, especially those which have had some periosteal inflammation or irritation, we can easily find thickened membrane. A recent study of several thousand of sections of carefully selected teeth has convinced me that in the case of normal teeth, after extraction, it is difficult, if not impossible, to demonstrate the presence of peridental membrane ; whereas in carious teeth, particularly those with periosteal inflammation, a thick layer of peridental membrane is always present. Therefore I am in favor of considering sections from such teeth as *pathologic* material.

In studying the development and relations of the peridental membrane, sections were made of animals' teeth, fetal and matured, including serial sections of one and of both jaws, to show the relations of teeth and membrane *in situ*. So far as I have pursued this work, it has been anything but satisfactory, for the following reasons :

1. It is difficult to secure good specimens of membrane.
2. When obtained, it is hard to preserve the membrane normal and to cut sections from it.
3. Sections show poor results from staining, as the effect of some acid reagents prevents the securing of sharp definition and contrast.
4. Even with good teeth, it is difficult to secure the membrane in toto, as the paraffin sections are very liable to become brittle or to curl up.
5. Much important material is lost by decalcifying agents and the irregularity of their action.
6. It is difficult to obtain maxillæ with teeth *in situ* which are fresh enough for examination.

Dr. Black* says, "The time the tissue remains in the imbedding material must only be counted by minutes, never by hours ; and if, after its removal and placing the material in water, it does not swell to its normal proportions in every part, which failure may be detected after sufficient experience by its appearance, it should be cast aside and a new effort made."

This statement is open to question, if we may trust our workers in neuro-technique. Poor results are too often occasioned by hurried imbedding and infiltrating with the penetrating and clearing agents. If once the material has been properly and thoroughly hardened when fresh, the paraffin ought not to cause shrinkage. Tissues may be cut fresh in gum, ether, and aniseed oil ; but with these methods we expect more shrinkage. Personally, I prefer to use weak decalcifying agents for a number of days, instead of strong solutions for a short time, as advised by Dr. Black ; for I believe, if the material has been carefully fixed, no bad shrinkage will result.

---

* "Periosteum and Peridental Membrane," pages 18 and 19.

The absence of any concise discussion of this department of odontologic science in current literature is much to be deplored. So far there is only one small compilation on the subject, and this deals chiefly with the methods for general histologic work, rather than with the methods suitable for dental microscopy. Further original investigation is much to be desired. The best way is to secure some tissue, and harden portions of it in various ways, recording every particular ; and then, by measuring, estimate the amount of shrinkage, the action of the hardening agent on the cells, as regards the distinctness with which they show, and their behavior in relation to staining agents. The previous generation of investigators have left us an enormous labor in correcting their errors, for they dogmatized upon observations of tissues profoundly altered or modified in course of preparation. All the science of modern histology, with its many warnings and precautions, is one great safeguard for avoiding these errors in future. To save the tissue elements which so readily distort after death, we must have recourse to an immediate preventive, viz : *fixation*. This may be done by chromic acid, Flemming's solution, Carnoy's modified by Van Hook and Ohlmacher, osmic acid, bichlorid of mercury, gold trichlorid, or absolute alcohol. Fixing is especially necessary in preparing the embryonal material. When the material contains cartilage, bone, or dentine, we may use the same fixative, but we must follow it by a decalcifier. In the fixing agent it must stay long enough to harden properly, and then be thoroughly washed, till testing shows it *acid free*. (This is not the case with certain special formulæ, which require acidity to stain well.)

The question of imbedding then follows. Personally I obtained the best results with the freezing microtome, if each section was carefully worked out. In some cases, however, it is probably necessary to use the paraffin or the celloidin method, and here again particularly concerning the embryonal material. In using paraffin, even though decalcified till soft, the teeth invariably become so hard that only a few sections could be obtained from each sample. It was especially hard to avoid "crinkling," so that thin and perfectly flat sections could be made.

To obtain sections of the hard and soft tissues together, the method of Drs. Lavis and Vosmaer, now better known since elaborated by Weil, is one of the best, although requiring much time and patience. Chromo-nitric or chromo-hydrochloric acids are good. Picric acid is good, but very slow in its progress. The following are a few of the most successful formulæ :

Fresh teeth were dropped at once into—

I. Muller's fluid.

II. Chromic acid, 1/6 per cent., 2 parts ; alcohol, 1 part.

These were changed constantly, kept in the dark, then thoroughly washed, and decalcified in different solutions. It was here that such contrasting results were observed.

III. Decalcification by nitric acid C. P., 2 per cent. aqueous solution, changed daily ; time required, eighteen days, to allow a needle to penetrate ; then thoroughly washed, and in some cases passed through an alkaline solution ; then hardened in alcohol of graded strengths. Notes : "Membrane intact. Pulp remained in the central canal. The membrane does not shrink, and the cells stain fairly well, but not sharply and clearly. Carmine gave better results than logwood. If strong solutions were used, material must be closely watched, as the acid seems to act suddenly when decalcification is nearly complete,—*i.e.*, the tissues, though still hard when examined, may in an hour or two later be all broken into useless detritus."

IV. Chromic acid, fifteen grs.; distilled water, seven ounces; nitric acid, thirty minims. Changed on fourth day to one-half the strength, using fresh fluid daily. Time, eighteen days. Notes: "The membrane appears to be attacked, partially eaten off; it does not shrink; the cells stain well, and the pulp is in excellent condition, showing nerves and ganglia cells in a marked manner."

V. Palladium chlorid, 1-1000 per cent. in water ten parts; hydrochloric acid, one part. Changed once. Time, four or five days. Notes: "Does not affect the membrane; the results of cutting and mounting gave most perfect specimens. Staining was not sharp and clear, though somewhat improved after prolonged soaking in solutions of sodium bicarbonate or lithium carbonate, and then staining for thirty-six to forty-eight hours. Care must be exercised with logwood to prevent precipitation, and the stains should be renewed during the process. The pulp-canal showed merely the framework, but no tissue elements. It demonstrates the longitudinal fibers nicely, and stains them brown." Sections can be stained somewhat if placed in one to three hundred or six hundred solution of palladium chlorid for one to three minutes, rinsed in water, and then put into a cold, saturated solution of picrocarminate of soda for eight to sixty minutes. Mount in dammar. Glycerol gives good results here as a mounting medium for immediate use; but for hard or non-decalcified specimens, it affects the structure later. Equal parts of palladium and platinum chlorid is useful where a thickened membrane is found, as it shows connective tissue well.

VI. Phloroglucin is a good decalcifier, and preserves all elements but red blood-cells. The agent itself covers the organic part of the tissue against the action of the mineral acids, which can therefore act on the inorganic structure in a more concentrated solution. As it is the most rapid decalcifier I have used for bony structures, I recommend great caution in its use for teeth, which it affects somewhat more slowly. To increase its speed thirty-five to forty-five per cent. nitric acid C. P. can be added, and then wash for at least two days in running water. Staining is easily accomplished after using phloroglucin. If hydrochloric acid is preferred to nitric, it may be added in the proportion of thirty per cent. acid with one-half per cent. sodium chlorid.

VII. Arsenic acid, two per cent. aqueous solution, changed daily. Time, fifteen days. "Results were uniformly good. Membrane normal, cells stain sharply, pulp shows well, filling the canal completely. Arsenic evidently has some special staining powers, as seen in the nuclei of the leucocytes."

VIII. Hydrochloric acid and nitric acid (Hopewell Smith's method).* Harden three to four weeks in Muller's fluid; alcohol ten to twenty days. Wash in water. Seal the apical foramen with collodion. Immerse in a fifteen per cent. solution of the following to decalcify:

---

* *J. R. M. S.*, 1892, page 433, and A. Bolles See's "Vade Mecum."

℞—HCl, 12 parts;
HNO_3, 30 parts;
Aquæ dest., 108 parts. M.

Immerse in 12 cc. of a ten per cent. solution of HCl, then after fifteen hours add 1.5 cc. of HNO_3, and after forty-eight hours add again 1.5 cc. of HNO_3. After seventy-five to eighty hours, wash half an hour in a solution of lithium carbonate, five grains to the ounce of water. Wash in water. Cut in pieces, place in gum mucilage, and cut.

IX. Hydrochloric acid and glycerol, in the proportion of HCl 5 parts, glycerol 95 parts; is very slow in action, but softens the teeth and preserves the tissues nicely.

X. Perenyi's fluid is a most useful agent, and gives good specimens, though the subsequent staining is not sharp.

XI. Gold trichlorid, one to two per cent. aqueous solution, is very useful to demonstrate the transverse fibers, provided the teeth are fresh. Underwood's method may be used when the teeth are not perfectly fresh.

Staining agents. The stains used were logwood, borax-carmine, picro-carmine, orange, and rubin (S), Weigert's method. Dehydration in clove oil or cedar oil.

Alum-carmine and glycerol are both liable to dissolve carbonate of lime, and should not be used where we wish to preserve pulp-stones, etc.

Preservative and mounting media. Cut sections are apt to curl up when preserved in alcohol. This may be prevented by adding a small proportion of glycerol or carbolic acid to the alcohol. If preferred, one or two per cent. of the standard (forty per cent.) solution of formalin keeps indefinitely. For mounting, balsam in xylol, chloroform, glycerol, and glycerol-jelly; monobromid of naphtha; dammar.

Conclusions. 1. No *perfect* decalcifier has been found, but arsenic acid, phloroglucin, palladium chlorid, nitric acid, and chromic acid give fair results. Preferred in the order named.

2. It is difficult to stain perfectly after decalcification, except in case of phloroglucin and chromic acid. If a satisfactory stain could be found to use after palladium, I would greatly prefer the latter as a decalcifier, even though expensive, for a small quantity of the solution goes a long way.

Later on I hope to make further reports of the use of this agent, and to secure better and more reliable results.

If some points are gained in the technic of preparation, it has amply repaid the effort of much patient work of investigation. I wish here to thank my assistant, Miss M. Anderson, for the very valuable help cheerfully given to this work.*

The work of the Section being completed, it adjourned to meet with the association in Philadelphia, the first Tuesday in June, 1897. The officers of the Section, Dr. R. R. Andrews, president, and Dr. E. S. Talbot, secretary, were re-elected to serve at the next meeting.

---

* See "Histology of the Teeth,"—Note on Preparation, etc; also in *International Journal of Microscopy and Natural Science*, 1889, July and October; 1892–1893, January; also in *Scientific Inquirer*, vol. ii, page 196.
Hopewell Smith on "Micro-Methods in Dental Histology"
Underwood, "Dental Histology."

AMERICAN DENTAL ASSOCIATION.

FIRST DAY—*Morning Session.*

THE thirty-sixth annual session of the American Dental Association was held in the ball-room of the Grand Union Hotel, Saratoga Springs, N. Y., commencing Tuesday, August 4, 1896.

The association was called to order by the president, Dr. J. Y. Crawford, of Nashville, Tenn. Prayer was offered by Dr. W. H. Morgan, of Nashville.

The session was largely devoted to routine business. The resignations of Drs. H. W. Gillett and W. V. B. Ames were received and accepted.

Dr. WILLIAMS DONNALLY, chairman of the committee on National Museum and Library, read the report, of which an abstract follows:

After reciting the purpose of its appointment, to co-operate with the officers in charge of the Army Medical Museum and Library in enriching its stores of dental literature and museum specimens, the committee referred to the immense value of the opportunity herein afforded the dental profession to accomplish essential objects otherwise impossible of attainment. Never was there opportunity more freely offered a profession to demonstrate its value, to acquire a higher rank among the learned callings, to acquaint the professions and the general public with its achievements, and to secure the preservation, classification, exhibition, and facilities for the study of all things pertaining to it of present or future historical and educational value.

The museum contains more than 35,000 specimens, and, like the library, is open to the public, the intellectual property of all professions and classes. Its dental section may be made its most attractive department and the greatest object-lesson of its kind in the world if the efforts of the management are met with a corresponding interest on the part of dentists. Dr. D. L. Huntington, Deputy Surgeon-General, the chief officer of the institution, has recently acquired by purchase a number of valuable and beautifully mounted specimens, most of which are rare. He also purposes to transfer to the dental section such objects as are of special interest to dentists, which are now classified in other sections or distributed through the large general collection, enriching our section with many valuable specimens which dentists could never acquire from their own resources.

The number of accessions so far from the efforts of the committee is small,—perhaps one hundred,—but an interest has been aroused which warrants the expectation of contributions of the kind needed, namely, series of models, apparatus, drawings, etc., illustrating various operations, methods of treatment, and their results. The committee also hopes that the leading college faculties will illustrate their methods of training, etc. A number of state and local societies have indorsed the action of this association in the premises, and appointed committees auxiliary to this committee.

As to the kind of specimens desired, anything illustrative of any part of dentistry, or which would, alone or in connection with other specimens, throw light on the etiology, pathology, or treatment of diseases and deformities of the teeth, jaws, etc., would attain a greatly enhanced value by being placed here.

Referring to the library, the largest and most complete of its kind in existence, the report suggested that voluntary contributions by publishers and authors would permit the money available for the purchase of their works to be used in other directions equally essential.

As a feasible plan of continuing the work already begun, the report suggested the appointment of five members of this association as a national committee, charged with the duty of promoting the effort to build up a great national dental museum and library; and that this association recommend the appointment of committees auxiliary to the national committee by each of the local, state, and other dental societies in the United States; and that the sum of one hundred dollars be appropriated, to be used with other donations, for the purpose of defraying necessary expenses.

The report was adopted, and the national committee recommended was appointed at a later session, as follows: Drs. Williams Donnally, Washington, D. C.; J. Taft, Cincinnati, O.; H. J. McKellops, St. Louis, Mo.; Henry W. Morgan, Nashville, Tenn.; Thos. Fillebrown, Boston, Mass.

The president, calling the vice-president to the chair, read his annual address, the principal feature of which was its advocacy of the enactment of uniform laws throughout the states for the regulation of the teaching and practice of dentistry, just, plain, and simple in their requirements, and with a penal code so imperative that none would dare disobey. Under such laws, a dentist whose diploma from a reputable dental college had been registered in one state would be entitled to registration in any other on the presentation of a certificate from the state board of dental examiners of the state where first registered, certifying the fact of the registration, and that he had been engaged only in the reputable practice of dentistry in that state.

To further this object, Dr. Crawford suggested the appointment by the association of a committee of one member from each state to act with similar committees from the national associations of dental examiners and dental faculties in the formulation of a uniform law, and to present the same for enactment in the various states as nearly simultaneously as possible.

In view of the interest manifested in the proposed union of the American and Southern Dental Associations, the address suggested that the next meeting be held at Old Point Comfort, which the Southern Association has selected for its next meeting, in order that a full, free, and frank discussion of the question of consolidation may be had, and the matter be finally and permanently settled. In case consolidation cannot be accomplished, he suggested that this association hereafter hold its meetings in the three grand divisions, the Northeast, Northwest, and South, each in turn, in order that the whole profession may have its full share of the benefits resulting from our national organization.

The address announced the death of Drs. W. H. Dwinelle, P. G. C. Hunt, and C. W. Spalding; it also commended the work of the committee on National Dental Museum and Library.

The address was referred to a committee consisting of Drs. W. H. Morgan, C. A. Brackett, and A. H. Fuller, who at a later session reported that while they were heartily agreed upon the desirability of the enactment of uniform laws, as advocated, they were so impressed by the differing conditions now existing in the different sections of the country that they doubted the practicability of securing absolutely uniform legislation in any large number of the states within the near future. They also regretfully expressed doubt of the expediency of appointing at the present time a committee to be charged with such undertaking.

Dr. E. A. BOGUE, New York, read a short paper, relating how a dentist, Dr. Michaels, of Paris, had constructed a bridge of platinum and iridium to restore to its original length a lower jaw from which six centimeters of the bone had been exsected in an operation for sarcomatous tumor by Dr. Pean. The bridge was screwed to the two fragments of the jaw, the cicatrix being opened two months after the operation to permit it being adjusted. The apparatus, which restored the normal appearance, was worn for several months, reunion by first intention taking place all along except at one point at the angle of the jaw; but the patient was tuberculous and died later on.

Dr. Pean applied to Dr. Michaels to have him construct an apparatus to replace the upper portion of the humerus with the joint. The result was the apparatus which was shown, a duplicate of which was constructed for Jules Pedoux, of Paris, a baker twenty-seven years old, afflicted with osseous necrosis, tubercular in character. Resection of the humerus for one-half its length was made by Dr. Pean, March 11, 1893, and the apparatus was immediately screwed into place, the upper portion being attached to the scapula, the lower to the humerus, with screws; two loops held the capsular ligament in place. The apparatus was so constructed that the movements of the ball-and-socket joint, the up and down, backward and forward,—pronation, supination, and rotation,—all were possible. The materials used were hard vulcanized rubber and platinum. After one and a half years the patient brought refreshment to a party of whom the writer of the paper was one. He held bottles in his left hand, drawing the cork with his right, and waited upon the table with almost as much facility as any one. At that time there were two places upon his arm where now and again a drop of pus oozed. One year later, bone was found to have formed sufficiently firm to allow the platinum wires to be cut, the screws to be removed, and the apparatus to be gently withdrawn. The arm was strapped to the breast for six weeks, and in November, 1895, the writer had pressed that arm with considerable vigor, the patient smiling in the mean time and telling him to press harder, as there was no pain. There had been a reformation of bone, and the joint was again in working order, though the arm was shortened one and a half inches; but to all intents and purposes it performed its functions.

Adjourned to 7.30 P.M.

Evening Session.

The association was called to order by President Crawford at 8 o'clock P.M.

Section V, Materia Medica and Therapeutics, was called, and Dr. J. S. CASSIDY, Covington, Ky., chairman, read the report, which follows:

The process of cataphoresis has probably been the most interesting new feature in dental therapeutics introduced during the past year. Cataphoric medication, however, has been unconsciously practiced, to a limited extent, for several years, by what was supposed to be merely the effects of the electrolysis of certain drugs in the local treatment of alveolar pyorrhea and other septic conditions pertaining to the teeth.

At the clinics of the dental section of the International Medical Congress, at Washington, in 1887, Dr. W. V. B. Ames exhibited a simple electric appliance for developing active iodin, at the desired point, by the electrolysis of KI. At the same clinic, another gentleman, whose name the writer has forgotten, adopted similar means with a solution of NaCl to bleach darkened teeth. This statement is made merely with a view to the recognition of evolution in this phase of electro-therapeutics, and not for the purpose of diminishing the credit due to Professor Morton and others for introducing this new osmotic treatment.

The physiological benefits obtained, in the majority of cases, through cataphoresis, are accepted facts; but the phenomena involved in their production as yet remain unexplained.

Heretofore the effects of electric currents on compound liquids have been studied only in connection with electrolysis; and the questions might be asked:

Does cataphoresis ever occur free from electrolysis? Yes.

Does electrolysis, of an electrolyte in porous solid or semi-solid matter, always accompany cataphoresis?

To this I would answer No, as witness the passage of water in moistened clay toward the cathode, without suffering decomposition; and, conversely, the decomposition of KI in contact with gum tissue, where no intromission of the freed iodin is apparent. This latter example seems to prove that at least one of the laws of ordinary electrolysis might be applied with advantage in many cases to our choice of drugs; for instance, those whose decomposition will supply its electro-positive radical as the active agent will penetrate more deeply; otherwise, as in the case of KI, the electro-negative radical I will not be drawn or pushed cataphorically toward the negative pole: but when free iodin in aqueous solution is used, it acts most charmingly, owing to the carrying power of the water, absence of chemical action, and consequent non-interference with its passage by a more highly electro-positive radical. The extra energy noticed in bleaching, of electro-negative O developed by this process from aqueous pyrozone, may be accounted for by its greatly increased volume and pressure, due to the electrolysis.

Electro-negative radicals are attracted toward the anode and the positive radicals to the cathode, probably somewhat according to the following arrangement of KI:

$$\begin{array}{ccccccc} & & \longrightarrow & & & & \\ & K & K & K & K & K & K\ - \\ +\ I & I & I & I & I & I & \\ & & \longleftarrow & & & & \end{array}$$

Dr. L. P. Bethel has reported, recently, successful applications of this method in introducing solution of AgNO$_3$ into root-canals; the canal in each instance, although too small for any broach to enter, was completely permeated. This statement is not surprising, however, if we consider the nature of the substance. It decomposes into basic and acid radicals by contact with organic matter, even when applied topically; it is a good electrolyte; and, therefore, the influence of the electric current causes further progression of the basic radical Ag_2O than would occur did separation not take place. The silver oxid deposits as an insoluble, black, inert residue, and the acid radical of the salt escapes with water as nitric acid:

$$2AgNO_3 = Ag_2O + N_2O_5.$$
$$N_2O_5 + H_2O = 2HNO_3.$$

One other rule of electrolysis may be alluded to in this connection, namely, "decomposition of an electrolyte is in the ratio of its chemical equivalent." Accordingly, 9 parts by weight of H_2O, 98 of H_2SO_4, and 166 of KI will react simultaneously by the influence of the same current.

This rule may enable some one to construct a list of—may I venture to name them?—"*Cataphoretics*," by combining in certain proportions a too active conductor with a less active one, as in the case of cocain hydrochlorid and guaiacol.

Objections have been made to the use of sulfuric acid by this method, on account of its loss of power by electrolysis. This, however, is not practically true, for although it decomposes into free H and sulfione, it is again reconstructed at the expense of the water present, enabling the nascent molecule to attack the dentine with more than usual energy, at the same time setting O free.

$$H_2SO_4 = H_2 + SO_4$$
$$SO_4 + OH_2 = H_2SO_4 + O.$$

A liquid conductor, more or less above zero, seems to be essential to this process, and different preparations of the same active principle are indicated for the variations in treatment. As is already well known, the action of cocain hydrochlorid is more effective in reducing the sensibility of dentine, if it be retarded by a non-conductor, such as some of the phenols, of which guaiacol, thus far, is preferred. But when using this salt as a local anesthetic for soft tissues, a strong aqueous solution would be my own preference.

Dr. Custer uses blotting-paper, saturated with the solution, and of a size corresponding to the area to be anesthetized; he places the pad in position, a silver coin is then interposed between it and the anode, and the current turned on. For soft tissues both voltage and amperage may be increased above that indicated for sensitive dentine, without producing any unpleasant effects.

In preparing for extracting teeth, a forked anode, adjusted by a ball-and-socket joint, should be used, one prong placed in the cavity of decay, if there be such, with cocain held by cotton wool, and the other point placed well up on the gum in the manner described by Dr. Custer. Dr. Custer further writes: "I am satisfied on the following: cocain, cataphorically applied on the mucous membrane and upon the cuticle as well, is almost, if not quite, as effective as a hypodermatic injection. It also possesses these advantages:

"First. The application itself, if properly conducted, is painless.

"Second. There is less danger, because the drug is diffused, and it is not possible for the full dose to enter into the venous circulation, as may happen when administered by the syringe. (I believe all the cases of sudden collapse by injection are due to the dose being injected into a vein and thereby carried, undiluted, to the heart and medulla reflexly.) It is when the cocain is mostly entered into the arteries that the anesthesia is best and the danger least.

"Third. The danger of septic inoculation is overcome."

A few weeks ago the attention of the writer was called to the decided acid reaction produced by cataphoresis of cocain hydrochlorid on sensitive dentine. This reaction is due to electrolysis of the salt, the alkaloid proceeding in search of its beloved cathode, while the acid HCl remains at the surface near its own favorite anode. At first this condition suggested the presence of an enemy, but later experiments proved that the relatively small quantity of acid developed can be of no serious consequence to the dentine.

A new remedy has recently made its appearance, bearing the name of eucain, which will probably soon claim a large share of the honors hitherto belonging to cocain, as a local anesthetic. It is an artificial alkaloid, said to be produced by the reaction between, principally, acetone (dimethyl ketone, CH_3COCH_3) and ammonia. The favorite salt is, like that of cocain, the hydrochlorid, which, evaporated from aqueous solution, retains one molecule of water of crystallization, $C_{19}H_{27}NO_4HClH_2O$. Eucain hydrochlorid presents the appearance of a white, odorless, crystalline powder, of a bitter quinin-like taste, soluble in water, alcohol, and chloroform. It induces some hyperemia of the mucosæ, rather than anemia, when applied locally, but, nevertheless, it causes well-marked loss of sensibility. As a "cataphoretic" obtundent of dentine it seems to act favorably, although more experiments will have to be made with it before its virtues in this direction are accepted as satisfactory. From the literature accompanying the sample sent me I learn that eucain is less poisonous than cocain, although their dosages are approximately the same; that lethal doses cause excitation of the central nervous system, convulsions affecting all the muscles, general paralysis, and, finally, death of the animal by respiratory failure. For producing local anesthesia by hypodermatic injection it is advised to make a solution of one part of eucain hydrochlorid to ten parts of sterilized water. Such a solution, it is claimed, remains permanently unchanged and can be boiled without causing decomposition. In this particular, at least, it has a decided advantage over cocain; it is probably uniform in its action, other conditions being equal, on account of its immediate derivation from pure chemicals, instead of indirectly from vegetable sources. The claim is made, further, that no evil effects have thus far been reported as sequelæ of hypodermatic injection for the removal of teeth, although the anesthesia, in point of duration and intensity, was fully as satisfactory as that produced by cocain.

While acknowledging that there must be differences in degrees of danger by the use, and sometimes abuse, of different drugs, introduced by the needle, the evidence of experience proves that unpleasant consequences may follow such an operation, even when the most innocent of all substances be the only one employed.

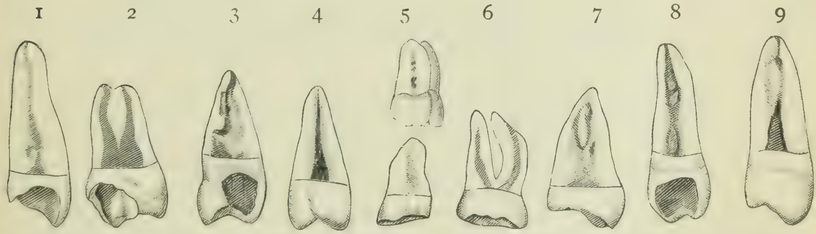
At the conclusion of the reading, Dr. Cassidy stated that the Section would present also two papers, by Drs. L. P. Bethel and Joseph W. Wassall.

Dr. L. P. Bethel, Kent, O., read his paper, which was entitled "Lining Root-Canals," as follows:

In the treatment of teeth with devitalized pulps, a medicament that not only sterilizes the contents of the root-canal, but leaves behind an antiseptic deposit which prevents the subsequent development of micro-organisms, would be an ideal disinfectant.

With this thought in mind I began a series of experiments, some months ago, taking nitrate of silver for the first agent. We know how useful this salt has been in the treatment of certain superficial cavities in the teeth of adults and various cavities in the teeth of children, preventing further decay as long as the discoloration remains. If in this location, where it is exposed to the varying conditions of the oral fluids, it will prevent subsequent decay for a considerable time, why should it not remain unchanged for a much longer period when sealed within a root-canal, and perhaps remain as a permanent barrier to the development of bacteria?

How to get the silver nitrate to permeate the canal so as to coat it thoroughly from pulp cavity to apex of the root was a question of first importance. Repeated attempts at pumping it into the canal by means of wooden points, broaches, etc., proved unsatisfactory, for the silver-nitrate solution would not go beyond the point of penetration of the broach, and the cases most desired to treat were the small, branching, or tortuous canals, where it was impossible to pass even a broach. By the aid of cataphoresis, however, the silver nitrate was forced beyond where the broach extended, into small canals, etc., as shown by the specimens here presented.



1. Operated on in the mouth with 50 per cent. solution silver nitrate. Crown cavity protected from discoloration by a thin coating of melted wax.
2. Operated on in the mouth with 75 per cent. solution silver nitrate. Crown cavity protected with wax.
3. Operated on in the mouth with 75 per cent. solution silver nitrate.
4. Shows perfect lining formed, and penetration of the silver nitrate into the dentinal tubuli.
5. Freshly extracted tooth operated on outside the mouth. The crown and roots were filled with decomposing material which was not removed, the electrode and nitrate being applied to the surface; still the nitrate permeated the canals. Exposed surfaces of both canals shown.
6. Operated on outside of mouth. Foramen on inside of root.
7. Shows penetration in flat root with restricted and branching root-canal. Could not get broach more than one-eighth inch into canal.
8. Operated on, outside of mouth, for twelve minutes, attempting to force the silver nitrate through foramen of root.
9. Shows returning branch of canal that might easily be left unfilled.

Microscopical examination shows that the nitrate of silver is carried, by means of cataphoresis, to a greater depth into the tubuli of the dentine, more thoroughly sealing them, than when applied to the surface by ordinary mechanical means. In the preliminary experiments out of the mouth, the silver nitrate was used in connection with various agents, such as sulfate of soda, one per cent. solution of sulfuric acid, etc.; but the silver nitrate being itself a good conductor of electricity, it was found most satisfactory when used alone in an aqueous solution made with distilled water to avoid all organic material. Various strengths were employed, from ten per cent. to a saturated solution, those giving the best results being from forty per cent. to seventy-five per cent. solution.

The process of application is a simple one: Adjust the rubber-dam, and, if the crown of the tooth needs protection from discoloration, apply a thin coating of melted wax to the surface of the crown cavity; then apply the silver-nitrate solution to the canal by means of a wooden toothpick, or other suitably-shaped piece of wood, pump the solution into the canal, with a broach, as thoroughly as possible, apply electrode to pulp canal opening, place pellet of cotton saturated with the silver-nitrate solution around the electrode at the orifice of the canal, and the electricity does the rest.

The saturated cotton turns first a light green, which grows darker until almost black, and serves as an indicator. The time of application will vary according to the condition of the root-canal, its size, whether well opened, strength of current, and per cent. solution used. The higher per cent. solution the better conductor it makes, and the quicker it is deposited. From one to five minutes seems to be ample time.

After removing the electrode, cleanse the pulp-cavity and canal as thoroughly as possible with dilute ammonia, to neutralize the nitric acid formed, which also hastens the darkening of the nitrate. Then dry with hot air.

In the majority of practical cases, I have been using the nitrate of silver after the root-canal has been sterilized, although in several cases it was used without previous sterilization, the cavity sealed, and no further trouble experienced.

This root-canal lining is not advocated for all teeth. Indeed, the practitioner must use judgment in its application. It would not be advisable in the anterior teeth, on account of discoloration, or teeth where the foramen is large, as in teeth not fully developed, and others, on account of the liability of forcing it through the apex of the root. Just what would result from such an accident I am unable to say from practical experience. I have tried to force the solution through the apex of a normal root, out of the mouth, but in every instance it has penetrated just through the foramen and stopped, due possibly to the forming of an albuminate when coming in contact with the tissues at the end of the root, and thus limiting its own action.

The object of these experiments is to find a means of treating root-canals that are too small to admit a broach, those branching or tortuous, those in flat-rooted teeth, etc., where it is doubtful about inserting a protecting root-filling. If such root-canals are thoroughly lined with the nitrate solution, and it penetrates somewhat into the tubuli, as it does, the probability is that there will be no subsequent trouble, even though the root-filling should be defective; and, indeed, it is a question whether root-filling would be necessary at all, especially in small canals.

Roots treated by this process out of the mouth, when filed down, reveal the outlines of the canals, their constrictions, obstructions, and, in some cases, unlooked-for branches that probably would not be found in ordinary root-treatment and filling, and left, perhaps, as a harbor for bacteria in which to multiply and cause subsequent trouble.

This is only the beginning of a series of experiments in this direction. What the future may disclose time alone will tell.

Dr. FRANK ABBOTT, New York, had listened with considerable interest to the two papers which had just been read, although he had never used cataphoresis in his own office, and he had never seen an apparatus for the induction of cataphoresis that would do away with the great amount of machinery which up to this time seems to be a necessary part of this work. He had great faith in the usefulness of electricity, but he does not see how any great amount of good is to come from the depositing of nitrate of silver in root-canals. It is likely to cause a discoloration of the dentine which is not readily restored. Especially he did not see the advantage of the method advocated in the filling of canals, when they could be handled so much more easily and just as surely by other means. He could not see why we should seek for more difficult ways of doing things. The paper said that its writer could hardly imagine that any great amount of harm could be produced if the nitrate of silver were forced through the apex. Yet, nitrate of silver is a strong escharotic, and in the strength of a seventy-five per cent. solution could produce great irritation. Of course, this may be overcome. It is a common thing to force escharotics through the apex, but we can reduce the risk of serious consequences. Thus, with oxychlorid of zinc we have only to produce counter-irritation on the gum and the difficulty is solved. So with others, unless it is something which will hold its substance; but if we use something which nature will take care of, there is little risk in forcing the medicament through the apex.

Dr. L. L. BARBER, Toledo, O., thought that if the cavity of decay was lined with a thin coating of wax, as suggested by Dr. Bethel in his paper, and the electrode then introduced into the canal, there would not be much trouble about the discoloring of the tooth. He had made a number of demonstrations of the method in the mouth, and thus far has had no trouble from discoloration.

Dr. H. L. AMBLER, Cleveland, O. It is not intended to convey the idea that this process of applying nitrate of silver for the lining of root-canals should be used in the teeth of young persons or where the foramen is not entirely formed. The development came about in this way. The speaker had suggested that if cavities for amalgam fillings could be lined with nitrate of silver, then, even if there was a break in the wall, there could be no decay as long as the nitrate of silver lasted, and from this came the idea which Dr. Bethel has suggested. Nothing new was claimed regarding the nitrate of silver except as to its use in the manner and for the purpose set forth in the paper. The first time it was publicly announced was last May, by Dr. Bethel and the speaker. They had no desire to force the idea on any one; they simply told what they had done, and others might try it or let it alone Anybody could apply nitrate of silver in the old way, but the advantage of the cataphoric method was that it drove the solution deeper into the tissues than the ordinary way. If there is any leakage through the pericementum, with such a lining for the canal as was described there would be no further leakage. This method should be applied only in those teeth whose canals will not permit the broach to be passed beyond the foramen. The speaker had suggested the application of wax to the walls of a cavity several months ago. The medicament itself does not penetrate under the wax to discolor the dentine, so that we simply get the effect in the canal. You can with the cataphoric method make a deposit of nitrate on the tooth so thick that it will shine like silver; you could not do that by the old method.

Dr. JOHN L. STEPHAN, Cleveland, O., could not say that he indorsed this method. If you decompose the nitrate and get metallic silver, it becomes inert, and is thus a foreign body. As to using the nitrate of silver by the cataphoric method for lining cavities which are to be filled with amalgam where the pulp is alive, he should think the pulp would be killed, and that therefore this method should not be used.

Dr. B. HOLLY SMITH, Baltimore, thought it a source of congratulation that the profession of dentistry takes tribute of all the sciences and all the arts, and utilizes them in its beneficent work. He was pleased with the paper, but he was puzzled to see from the specimens the course taken by the deposit. Why should the electric current select the tortuous windings of the canal as the channel for its passage, and not penetrate through the cementum and into the soft tissues?

Dr. JOSEPH HEAD, Philadelphia, wished to say a word with reference to the inquiry made by Dr. Holly Smith. Dry tooth-substance is a very poor conductor for the electrical current, and therefore the canal in teeth out of the mouth would naturally be a better conductor than the tooth-substance, even though it was poorly soaked.

Dr. JAMES TRUMAN, Philadelphia. It may be that this matter of nitrate of silver requires more consideration than has been given to it. Nitrate of silver will prevent microbes from developing, but we all know that it will discolor tooth-substance. Now, if it will be carried into the tooth by osmosis, where will be the limitation of its effect? The speaker had long ago experimented with nitrate of silver in the teeth, and he knew that it did not require electrical osmosis to carry it there. This he had demonstrated a year or more ago in relation to carrying it into the dentinal tubules, and he wanted to know how we were going to limit the action, how to stop it when once set in motion. If the statements of this paper go out from here without contradiction, many men will be set to experimenting on the lines indicated, and injury will be wrought. If we must have something to coagulate the albumen in the dentine, why not use oxychlorid of zinc? We found out long ago that the oxychlorid would not discolor the tooth. He knew very well that the chlorid of zinc would do the work, but he would not do it by electrical osmosis. He had proved long ago that nitrate of silver would coagulate albumen, but the chlorid of zinc would also do it, and it is a better antiseptic in such cases than any other he knows of.

Dr. M. L. RHEIN, New York. The remarks of the last speaker in regard to the danger in using an agent which is likely to discolor the tooth are worthy of serious consideration. He could personally indorse the superior advantages of chlorid of zinc in such cases He wanted also to speak of its application by electrical cataphoresis. If the method is good the medicament employed cannot be in too nascent a condition, and that is the advantage which we gain by electrical cataphoresis ; and in this action we have no better agent at our command than pure zinc, for by using it cataphorically we get the pure nascent chlorid of zinc, the form in which its effects are most pronounced.

Dr. J. TAFT, Cincinnati. It seems that an exaggerated view is taken of the coloration of dentine by nitrate of silver. Why is this discoloration produced? Nitrate of silver is a colorless fluid. Why then should it discolor the tooth? There is no coloration observed when it is first applied ; but if the nitrate is allowed to remain, in a little while the discoloration begins, because the solution is decomposed, the oxid is deposited on the surface, and the nitric acid is combined with the lime-salts. He had never seen a tooth discolored in the canals from the application of the nitrate on the surface of the tooth. It has been much used at the neck portions for sensitiveness, and there is always coloration if it is not removed promptly, but it is simply a coloring on the surfaces, a very superficial combination. Its affinities are soon satisfied ; it becomes as inert as chalk, and then there is no further action. So far as the decomposition has taken place, the surface of the tooth to which the nitrate has been applied is roughened ; but there is only a limited penetration, and it is taken away with only the slightest loss of tooth-substance. He had never seen a tooth deeply stained through the application of nitrate of silver. He could see no reason for using the cataphoretic process for the decomposition of nitrate of silver, when applied upon a tooth. The decomposition occurs promptly through the natural attractions of the elements, and ceases promptly when their affinities are satisfied. He does not believe that the electrical current adds anything to its energy, and does not conceive that it helps in any way that is specially advantageous. It has been said that amalgam fillings deeply stain, and that the nitrate of silver does not. The vapor of the amalgam penetrates the tubuli, and becomes oxidized, but does not unite with the tooth-substance. This is not possible with the nitrate of silver. The action is much the same as in the sulfuric acid process. The objection that it stains the tooth should not have much weight.

In reply to a question by Dr. Truman, Dr. Taft said that he had made slides of teeth to which nitrate of silver had been applied, and not a single one showed the penetration of the tubuli by the nitrate.

Dr. T. C. STELLWAGEN, Philadelphia, had been questioning in his own mind for nearly a year whether we were not complicating things by this expensive apparatus. In what per cent. of cases is cataphoresis necessary? For the past year he has been using an appliance so simple that he could hardly hope to hold attention to it. He sharpens these ordinary Japanese wood toothpicks to correspond to the size of the canals, and puts them into a jar of the medicaments he is using, some, for instance, in a strong solution of carbolic acid, some in crystals of carbolic acid. By the way, there is great difference in carbolic acids. Merck's has answered all purposes of the mineral acids. These toothpicks, when kept in the solution, become very flexible, and can be worked up into a very tortuous canal. You may not be able to get to the foramen with them, but you can get as far as is necessary. After washing out the cavity with water, go on and cleanse the canal with the toothpick, then perhaps with alcohol, then, after it is perfectly dry, use the medicament indicated. He often cuts off the pick and leaves it in the canal for a while, but usually he fills at once. He wanted to say a word about wax as a permanent filling ; it is so unirritating, and it will penetrate into all the canals, especially in the lower teeth, where there is so much trouble. His method of inserting it is to warm a probe and push down into the canals a little pencil of wax. If for a permanent filling, he forces down into the wax little gold points, which are cut off and finished, and you have the root filled with gold and lined with wax. He has yet, in a year's time, to have any trouble with teeth so treated. He can see no reason why the wax should not last as long as the tooth, and by the method described he succeeds in making a perfectly air-tight and water-tight filling.

Dr. A. W. HARLAN, Chicago, from some extended experience could say that nitrate of silver does not penetrate the dentine to an extent to cause a discoloration that would be disfiguring. It is only by the continued force of the electrical current that nitrate of silver can be driven to any extent into the dentine. It does not reach the cementum, because the deposit becomes too dense to allow the current to force it through the dentine. The speaker has a large number of teeth treated with the oils and with coagulants, and set in plaster, in paraffin, and in wax. Dr. Truman says that the chlorid of zinc coagulates the contents of the tubules. Why does it not injure the cementum? It is because the chlorid of zinc is self-limiting, and no experiments ever showed that it penetrated to any considerable depth in the dentine, because as soon as it has satisfied its affinity for water it ceases to penetrate. Chlorid of zinc, as soon as it satisfies its affinity for water, stops its action every time, and any fear that cataphoresis will drive it through the end of the root is useless. As soon as it gets to the soft tissue, it forms a superficial coagulated condition, and stops. He was glad that Dr. Bethel and his Ohio friends had been experimenting in this direction. The question involved will be brought up later on, but he wanted to disabuse the minds of those who had listened to the discussion of the idea which had been suggested that nitrate of silver would permanently discolor the dentine of a tooth.

Dr. TRUMAN. It has come now to a question of veracity. Dr. Harlan says it is impossible to carry nitrate of silver into the dentine. I say I have carried it almost through to the cementum. Which will you believe? It is a question of method, whether you succeed or not. He says further that chlorid of zinc will not coagulate the albumen through the tubuli. I say it will, and I have specimens to prove it.

Dr. RHEIN wished to make a slight correction in his previous remarks. He had used the term cataphoresis in describing the conversion of the metal zinc into the chlorid of zinc, when in fact the action is more in the nature of an electrolysis.

Dr. AMBLER wished to present a few facts in support of the position taken by the essayist. Nitrate of silver was used in the olden times to prevent the further progress of superficial decay, and also to prevent further erosion at the necks of teeth. By the cataphoric method the use of nitrate of silver for erosion is greatly facilitated. After adjusting the rubber-dam, hold it out of the way with a piece of gold cut to fit the tooth. Place a very small portion of cotton dipped in the solution on the platinum electrode, apply to the erosion, and turn on the current, say ten volts, or until the patient feels it, and hold the electrode there till the spot turns a slight shade of green. Do not keep it in position till it turns black,—only till the greenish shade appears, when the operation is completed. Remove the electrode then, and the spot operated on will turn black. This procedure will stop any case of erosion, and there will be no further action as long as the deposit remains there. The soluble electrodes spoken of by Dr. Rhein should be made of chemically pure zinc and chemically pure copper, and shaped to suit the case; as, for instance, in the treatment of pyorrhea, to conform to the shape of the pockets. Several dentists are experimenting in this direction, and experiments are being made in the hope of finding something which will take the place of the nitrate of silver, so as to avoid the discoloration which this substance produces. So far they have not been successful, because nothing else so far tried produces an insoluble compound in connection with the teeth elements. In using the method described in Dr. Bethel's paper, you do not, when a putrescent canal presents, put the electrode into it while in that condition. It should be cleansed first, the same as you ordinarily would, but just as far as the dampness extends the nitrate will discolor it. To those who have been using cataphoresis it is hardly necessary to say that there are some cases in which the pulp is sensitive through the thinness of the dentine left over it, where the pulp can be destroyed with cataphoresis in the application of nitrate of silver. A freshly extracted pulp has been completely coagulated just after it was taken out.

Dr. TAFT. Dr. Ambler says that the nitrate of silver forms an insoluble compound with the tooth-elements. He should have said insoluble in the fluids of the mouth; which is the reason why it remains for some time when the nitrate is applied, and why the solution does not penetrate deeper, and why, when decomposed by the action, it cannot pass in the solid form into the dentine. We have nitric acid on the dentine beneath, but this remains as a protection to the surface. Nitrate of silver does arrest erosion while it remains on the tooth, but if it is removed by any means the erosion begins again. It simply forms a shield against the agent which wastes away the tooth-substance.

Dr. J. D. PATTERSON, Kansas City, Mo., while using nitrate of silver a great deal, and believing in its value, thought it unwise to depend too much upon linings for cavities in the sense that has been led up to by the remarks of some of the speakers, for the reason that sooner or later such linings are likely to be disintegrated, and so to allow bacteria to pass. We should not permit ourselves to place too great dependence upon the nitrate of silver as a lining for a cavity to be filled with amalgam, to the neglect of the filling, but should rather depend upon an impermeable filling. One other statement which should not be permitted to go unchallenged is that the discoloration of teeth filled with amalgam is due to vaporization of the amalgam, because it is not so; it is impossible. The discoloration in such cases is due to a pigmentation of the dentine from the sulfurets or oxids formed, but not to any vaporization of the amalgam.

The subject was passed.

Adjourned till Wednesday morning at 9 o'clock.

(To be continued.)

At the session on Thursday afternoon, August 6, Old Point Comfort, Va., was chosen as the place for the next meeting of the association, and the following were elected officers: James Truman, Philadelphia, president; Thomas Fillebrown, Boston, first vice-president; W. R. Clifton, Waco, Texas, second vice-president; Geo. H. Cushing, Chicago, recording secretary; Emma Eames Chase, St. Louis, Mo., corresponding secretary; Henry W. Morgan, Nashville, Tenn., treasurer; S. G. Perry, New York city, A. O. Hunt, Iowa City, Ia , and W. W. Walker, New York city, members of the executive committee. The newly-elected president was installed, and appointed as members of the local committee of arrangements, J. Hall Moore, Richmond, Va., and T. H. Parramore, Hampton, Va.; and A. W. Harlan, Chicago, and E. T. Darby, Philadelphia, as members of the publication committee.

NATIONAL ASSOCIATION OF DENTAL FACULTIES.

THE thirteenth annual meeting of the National Association of Dental Faculties was held at the Grand Union Hotel, Saratoga Springs, commencing August 1, 1896.

The following colleges were represented:

Birmingham Dental College—T. M. Allen.
University of Denver, Dental Department—W. E. Griswold.
Columbian University, Dental Department—H. C. Thompson.
National University, Dental Department—J. Roland Walton.
Atlanta Dental College—Wm. Crenshaw.
Southern Medical College, Dental Department—Frank Holland.
Chicago College of Dental Surgery—T. W. Brophy and Louis Ottofy.
Northwestern College of Dental Surgery—L. L. Davis.
Northwestern University Dental School—Theo. Menges and Geo. H. Cushing.
Indiana Dental College—G. E. Hunt.
Louisville College of Dentistry—Francis Peabody.
Baltimore College of Dental Surgery—B. Holly Smith.
University of Maryland, Dental Department—F. J. S. Gorgas.
Boston Dental College—J. A. Follett.
Harvard University, Dental Department—Thos. Fillebrown.
University of Michigan, Dental Department—J. Taft.
Detroit College of Medicine, Dental Department—G. S. Shattuck.
University of Minnesota, College of Dentistry—Thos. E. Weeks.
Kansas City Dental College—J. D. Patterson.
Western Dental College—D. J. McMillen.
Missouri Dental College—A. H. Fuller.
University of Buffalo, Dental Department—W. C. Barrett.

New York College of Dentistry—Frank Abbott.

Cincinnati College of Dental Surgery—W. T. McLean.

Ohio College of Dental Surgery—H. A. Smith.

Cleveland University of Medicine and Surgery, Dental Department—S. B. Dewey.

Western Reserve University, Dental Department—H. L. Ambler.

Pennsylvania College of Dental Surgery—C. N. Peirce.

Philadelphia Dental College—T. C. Stellwagen and S. H. Guilford.

University of Pennsylvania, Dental Department—E. C. Kirk.

University of Tennessee, Dental Department—J. P. Gray.

Vanderbilt University, Dental Department—H. W. Morgan and W. H. Morgan.

University College of Medicine, Dental Department—L. M. Cowardin.

Royal College of Dental Surgeons of Ontario—J. B. Willmott.

The following colleges were elected to membership :

Howard University, Dental Department, Washington, D. C.—James B. Hodgkin.

Marion Sims College of Medicine, Dental Department, St. Louis, Mo.—J. H. Kennerly.

Dental Department of Tennessee Medical College, Knoxville, Tenn.—R. N. Kesterson.

The following applications for membership were reported favorably by the Executive Committee for final action next year :

University of Omaha, Dental Department, Omaha, Neb.; Ohio Medical University, Dental Department, Columbus, O.; Baltimore Medical College, Dental Department, Baltimore, Md.; Dental Department of Milwaukee Medical College, Milwaukee, Wis.

The New York Dental School announced its intention to complete its application next year.

The report of the secretary stated that there were in the United States fifty-three institutions teaching dentistry or conferring the dental degree, as follows: Dental schools in active operation, forty-six; organized during the year, two; in course of organization, one; corporations conferring the dental degree, four. Of the dental colleges, thirty-six were now members of the association, eight had applications for membership pending, two had signified their intention of applying, and the two newly organized have announced in their catalogues their intention to comply with the rules of the association.

The report of the Committee on Schools, presented by its chairman, Dr. Follett, stated that reports had been received from thirty-five schools as to their equipment under the resolution adopted last year. These reports showed that the schools were well provided with lecture-rooms, and in most instances with ample laboratory and dispensary accommodations, with sufficient and appropriate appliances. They indicate a broadening in the general course of instruction, as well as fuller courses in all departments. Several colleges have recently added courses in bacteriology and extended their work in histology and pathology in practical ways. During the year 1895–1896 the number of matriculates at the thirty-five colleges reporting was 5532; graduates, 1363.

Mr. MELVILLE DEWEY, secretary of the Board of Regents of the

University of New York, appeared before the association by invitation of some of the members, and gave a masterly address on the needs of the movement for higher education in professional ranks. Incidentally, Mr. Dewey explained some of the details of the system pursued in New York, and stated that, greatly to the surprise of those in charge of the various professional educational institutions in the state, the number of students had steadily increased since the higher requirements had been put into force by the Board of Regents.

Among the more important legislation enacted by the association were the following :

Regulating the Admission of Students.

Preliminary Examination.

The following preliminary examination shall be required of students seeking admission to colleges of this association :

——— High School.
——— 189

To the Faculty of ———

M —— —— desires to present ——self as a candidate for admission to the Course of Dentistry, —— ——

He has pursued in this school the branches against which numbers appear—the numbers being the standings upon a scale of 100. Our course requires five recitations or exercises weekly, in each branch. Our terms are ten weeks in length.

Preliminary.

2 terms Orthography, standing.
2 terms Reading, standing.
2 terms Writing.
2 terms Arithmetic.
2 terms Geography.
2 terms Grammar.
2 terms History U. S.
—
14

These are required in all cases, and fourteen counts given for the same.

Elective.

3 terms University Algebra, through Quadratics.
3 terms Geometry, plane and solid.
2 terms Physiology.
2 terms Physical Geography.
1 term Botany, with analysis of forty plants.
3 terms General History.
3 terms Natural Philosophy.
3 terms English Literature.
2 terms Civil Government.
2 terms Rhetoric.
2 terms History of England.
3 terms American Literature.
3 terms Chemistry.
1 term Commercial Arithmetic.
2 terms Astronomy.
2 terms Geology.
2 terms Natural History.
1 term Political Economy.
2 terms Drawing.
3 terms German.
3 terms Greek.
3 terms Latin Reader, Cæsar.
3 terms Cicero, four orations.
3 terms Virgil, six books.
1 term Book-keeping.
3 terms French.
2 terms Manual Training.

(After session of 1901–1902 U. S. History becomes elective, and entitles to 2 credits.)

For the Session of 1897–98.

Preliminary	14 counts.
Elective	18 counts.
Total	32

For the Session of 1898–99, 1899–1900.

Preliminary	14 counts.
Elective	27 counts.
Total	41

For the Session of 1900–01.

Preliminary	14 counts.
Elective	36 counts.
Total	50

For the session 1901–1902 and thereafter no Preliminary credits; forty-eight credits from the studies classed as elective.

When the text-book mentioned has not been completed, the exact amount of work done should be stated.

The candidate above named is recommended as of good moral character, studious habits, and, judging from the past records, able to carry forward the work of a dental college course.

The rules for the admission of students take effect with the session of 1897–98.

—— —— Principal.

Admission to Advanced Grades on Certificates.

The colleges of this association may receive into the advanced grades of Juniors and Seniors only such students as hold certificates of having passed examinations in the studies of the freshman or junior grades respectively, such certificates to be pledges to any college of the association to whom the holders may apply that the requisite number of terms have been spent in the institutions by which the certificates were issued.

Intermediate Certificate.

Place Date

This certifies that ———— has been a member of the ———— class in the ———— during the term of ————

He was examined at the close of the term in the required studies, as stated herein, and is entitled to enter the

Freshman Year	Junior Year.
[List of Studies]	[List of Studies.]

This certificate shall by correspondence be verified by the dean of the college by which it was issued. Without such certificate no student shall be received by any college of this association for admission to the advanced grade, except on such conditions as would have been imposed by the original school, and these to be ascertained by conference with the school whence he came.

Limiting the Time for the Reception of Students.

No member of this association shall give credit for a full course to students admitted later than ten days after the opening day of the session, as published in the announcement.

In case one is prevented by sickness, properly certified by a reputable practicing physician, from complying with the foregoing rule, the time of admission shall not be later than twenty days from the opening day.

In cases where a regularly matriculated student, on account of illness, financial conditions, or other sufficient causes, abandons his studies for a time, he may re-enter his college at the same or subsequent session, or where under similar circumstances he may desire to enter another college, then with the consent of both deans he may be transferred, but in neither case shall he receive credit for a full year unless he has attended not less than seventy-five per cent. (75%) of a six months' course of lectures.

ATTENDANCE, EXAMINATIONS.

Attendance upon three full courses of not less than six months each in separate academic years shall be required before examination for graduation. The year shall be understood to commence August 1, and end the following July 31.

Beginning with the session of 1896–1897, the examinations conducted by the colleges of this association shall be in the English language only.

A student who is suspended or expelled for cause from any college of this association shall not be received by any other college during that current session In case the action of the first college is expulsion, the student shall not be given credit at any time for the course from which he was expelled. Any college suspending any student shall at once notify all other members of this association of its action.

APPLICATIONS FOR MEMBERSHIP.

Applications for membership in this association shall be made in writing, favorably indorsed by the faculties of two or more colleges of the association and the board of dental examiners of the state in which it is located.

Such application shall then be referred to a special committee of three which shall be appointed by the chair upon each application. The duty of this committee shall be to visit the school applying during its session, personally examine its facilities for teaching, methods of instruction, and efficiency of the faculty, and report to the executive committee, which report shall, if favorable, be acted upon.

Each application shall be accompanied by a sum of money sufficient to defray the expenses of the special committee.

The constitution was so amended that hereafter it will require a two-thirds vote instead of a majority to elect new members.

The following resolution, offered by Dr. PEIRCE, was on motion adopted :

WHEREAS, In view of various reports frequently being circulated derogatory to the character of certain schools without any one being willing to prefer charges sustaining such statements,

Resolved, That the Executive Committee be and is hereby authorized to exercise full power to investigate all such innuendoes or charges by visiting the school or schools, or authorize some one to perform this duty ; summoning witnesses, etc., in order that all such statements shall be sustained or proven false.

Resolved, That a sum to be determined by the officers, president, secretary, and treasurer, be and is hereby appropriated for the purpose of paying expenses essential to the carrying out of the provisions of the above resolution.

The following communication from the National Association of Dental Examiners was read and on motion adopted :

Resolved, That this association requests the National Association of Dental Faculties to enact a rule prohibiting colleges from receiving beneficiary students recommended by state boards and associations.

The following, offered by Dr. ABBOTT, was adopted :

Resolved, That the committee of three appointed by the chair to report on applications for membership shall determine and report to this association at its next meeting the minimum requirements of such colleges as desire to become members of this association as to length of course, plant, equipment, facilities for teaching, and the number and efficiency of its faculty.

Dr. BROPHY offered the following, which was adopted :

Resolved, That a graduate of a recognized dental college, who applies to a college of this association for the degree of Doctor of Dental Surgery or

Doctor of Dental Medicine, shall complete one full course of instruction in said college and comply with all other requirements of the senior class.

The following lie over till next year for final action:

Offered by Dr. BARRETT:

Resolved, That after the regular session of 1897-98 the annual college term for the members of this association shall be seven full months.

Resolved, That it is advisable that the National Association of Dental Faculties in future meet in connection with the National School of Dental Technics at a time of year when the colleges are in session, and before the time for the issuance of the annual catalogues.

A committee, consisting of Drs. Patterson, H. W. Morgan, and Kirk, appointed to consider the advisability of adopting the academic cap and gown for commencement day, reported in favor of adopting the intercollegiate system and in favor of lilac as the distinguishing color for dental schools. Laid over till next year.

The following were elected officers for the ensuing year: J. P. Gray, Nashville, Tenn., president; Truman W. Brophy, Chicago, vice-president; Louis Ottofy, Chicago, secretary; Henry W. Morgan, Nashville, Tenn., treasurer; J. Taft, Cincinnati, Thomas Fillebrown, Boston, and B. Holly Smith, Baltimore, Md., executive committee; H. A. Smith, Cincinnati, Thomas E. Weeks, Minneapolis, and J. D. Patterson, Kansas City, Mo., *ad interim* committee.

The newly elected officers were installed, and the president announced the standing committees as follows: S. H. Guilford, Philadelphia, Pa., J. B. Willmott, Toronto (Canada), Theodore Menges, Chicago, Ill., L. M. Cowardin, Richmond, Va., and James Truman, Philadelphia, Pa., committee on text-books; J. A. Follett, Boston, Mass., G. E. Hunt, Indianapolis, Ind., C. N. Peirce, Philadelphia, Pa., A. H. Fuller, St. Louis, Mo., and D. J. McMillen, Kansas City, Mo., committee on schools.

Adjourned.

UNION MEETING OF THE MARYLAND STATE DENTAL ASSOCIATION AND THE WASHINGTON CITY DENTAL SOCIETY.

(Continued from page 692.)

SECOND DAY—*Morning Session.*

THE convention was called to order at 10 A.M., and Dr. WILLIAMS DONNALLY read the following paper:

TREATMENT OF ORAL ACIDITY WITH MILK OF MAGNESIA.

It is not my purpose to attempt any addition to the voluminous literature on the subject of acid conditions of the oral cavity, with reference either to the theories of cause or to the disastrous effects as daily witnessed in the mouths of our patients. It is my purpose, however, to give a simple method of local treatment of certain pathological conditions of the teeth generally recognized as due to the presence of acids in the oral secretions,—a method which is probably so common as to call for some apology for its repetition here were it not that but for repetition much valuable information would be lost.

For years of my practice I knew no better treatment of these cases than to give the then indicated attention to the teeth and advise the use of lime-water, chalk, etc. This advice was given in good faith because it seemed to be the only means recognized by the profession, and because there was some resulting benefit in those cases in which the cause was local and not persistently active. In many cases in my own, and not a few in the practice of others, I could see only unsatisfactory results. For instance, in those cases of "white decay" about the border of the gums, the first appearance of which resembles a soft chalky deposit rather than the rapid disintegration of enamel and dentine, which it soon proves to be, I have removed the decay and formed the cavity with healthy margins only to find in a few months an extension of the same condition reaching out from the anterior or posterior border of the filling or toward a receding gum.

Also in cases of acid erosion, even when the cavity was formed to extend to the, as yet, unimpaired enamel, similar and equally as untoward results soon presented. This experience was of such frequent occurrence that I could feel justified in encouraging the expectation of only temporary benefit. In some of the cases the antacid treatment was pursued faithfully and watched closely, without apparent benefit. Later, by the preliminary use of nitrate of silver the results were somewhat better, but still in marked contrast with results now obtained.

For about three years I have modified the treatment of such cases only by adopting a more definite course of treatment preparatory for or to preclude the necessity of filling, and by the substitution of the milk of magnesia for all other antacids. In cases of the kind described it is my custom to cleanse the surface and apply nitrate of silver by means of small pointed sticks of wood. repeating until the abraded surface is stained and hyperesthesia relieved. The surface is then smoothed, if necessary, and burnished, the general condition of the teeth looked after, the care exercised by the patient inquired into and approved or corrected, and then the faithful daily use of milk of magnesia enjoined. It depends on the habits of the patient and the urgency of the case whether the use of the milk of magnesia through the day is insisted on, but in every case the necessity for its use the last thing before retiring at night is forcibly impressed, not only because any such agent is less effective in consequence of the more abundant secretions and the ordinary use of food and liquids during the day, but because the acidity is more marked at night, and its action prolonged without interruption for a much greater length of time.

The direction for the application of the milk of magnesia should include an effective means of coating the whole mucous membrane of the oral and buccal cavities, as well as the surfaces of the teeth, and the patient's effort to avoid the removal of the film formed.

This method of treatment will be found noticeably effective in retarding rapid decay of the teeth, and is especially serviceable to me in cases of children or timid persons of any age. In the two classes of cases described the need of more effective measures was particularly impressed, and the results have been so much more satisfactory than was at first trial expected that I feel I have accomplished a notable gain over former experience.

I will cite from memory a case of the most pronounced acid erosion I have ever attempted to treat conservatively. The patient, a single lady of sedentary habits, had recently removed from a large city to a small town while under medical treatment for failing health due to nervous strain and bereavement. Her hands showed several enlarged joints, and she said her physician had treated her some time before for symptoms of rheumatism and had made several analyses of urine, but with negative results. For a year or so previous to her first consulting me there had been no treatment save as to change of climate, diet, and exercise, but she had at that time the advice of a dentist whom you would recognize as a writer of ability on the subject of acid erosion. He regarded the case so interesting as to invite another student of reputation to examine and consult the patient separately from him, for the purpose of utilizing the information in their investigations. She was advised that the loss of the crowns was inevitable.

I found every surface of the crowns of the superior incisors marked by acid erosion, the outline of the pulp being plainly visible from the labial aspect. The cuspids, bicuspids, and molars, superior and inferior, were marked with eroded spots, a dozen or more of which called for fillings on the external faces and grinding-surfaces. She was referred to her physician for systemic treatment, and was assured by him that no constitutional disorder called for more than he was doing. The use of litmus after cleansing the mucous membrane by means of syringe and spray proved the presence of acid secretion. The local treatment consisted first in the application of lunar caustic to the sensitive points and to most of the abraded surfaces, and, second, the free use by the patient of the milk of magnesia, with massage of receding gums, and scrupulous care in the use of the brush and floss silk for two months. The superior incisors were then crowned, the crowning of certain other teeth deferred for a year's trial of treatment, the continued use of the antacid and especial care advised, the teeth requiring immediate filling were filled, and the patient dismissed for a year.

After the lapse of eighteen months the patient reappeared with practically no extension of the erosive process, and calling for a few fillings, which was thought to have become expedient in view of the increased prospect of preserving the teeth indefinitely.

Another illustrative case. A patient of thirty years, whose beautiful teeth of fair quality had required very little care in her twenty years of country life, and for the following ten years of city life had shown no excessive tendency to decay, began to show signs of extensive and rapid disintegration of the teeth simultaneously with the first signs of failing health. Numerous cavities formed in the course of one or two years, while besides the recession of gums, there appeared ten or twelve crescent-shaped erosions near the gum borders which exhibited a marked tendency to decay as soon as the dentine became exposed.

By this time the patient and her medical advisers realized that her health was seriously failing, and their faithful treatment for neurasthenia and serious impairment of the digestive function was commenced, and continued for nearly two years.

The local treatment was essentially the same as that described for erosion, though the cause of the acidity differs widely. No attempt was made to make permanent fillings for about three years, when the general health was improved and the local conditions gave hope of success.

While the use of nitrate of silver was essential for the comfort of the patient in each of these cases, and served to retard decay, I attribute the prevention of new cavities and the circumscribing of those already formed to the free and regular use of the antacid.

I have also found the local use of milk of magnesia useful and soothing in the treatment of ulcers, abrasions, and inflamed conditions of the mucous membrane of the mouth, and in the acid eructations of pregnancy and some of the forms of indigestion.

The chemistry and the minutiæ of the therapeutic action of milk of magnesia has been interestingly described by others, but my only object is to give my practical experience of its use in the mouth for the cases mentioned.

Discussion.

Dr. WM. M. HUNT, of Washington, asked the author if his use of the milk of magnesia had been local only, or whether he used it as a systemic medicine.

Dr DONNALLY said his treatment was local, as his cases were at the same time receiving treatment from a physician.

Dr. J. B. RICH, of Washington, said of all the drugs he had ever tried for the correction of acid condition in the mouth this only he had found successful. He had never seen a case of erosion of the teeth that he could not trace to the effect of uric acid in the system. The reason of the excellent results from the milk of magnesia is that it makes a deposit on the teeth which remains for several hours, thus protecting them from the acid. With him the results have been always satisfactory, arresting erosion in all cases. He described one case to which his attention had been called by a physician. Upon testing the mouth with litmus paper, the secretions were found to be alkaline, but the mucous glands were acid.

Dr. H. C. THOMPSON, of Washington, thought that local treatment would be inadequate to bring about a permanent cure without systemic treatment to remove the cause. While the milk of magnesia is present in the mouth we get a neutral condition, but the acid will return and the trouble recur unless the cause is corrected. Milk of magnesia should be used both locally and systemically.

Dr. C. C. HARRIS, of Washington, asked Dr. Donnally if he ever had come across a case where the anterior teeth were eroded on the palatal surface. He had such a case now so badly eroded that they have only a knife-like enamel-edge left, and that is breaking away, and the teeth will soon be gone entirely. In regard to allaying the pain in sensitive dentine, the milk of magnesia treatment, pursued for a few weeks, will place the teeth in such condition that they may be operated upon with ease and comfort.

Dr. MONTELL said the local use of milk of magnesia was of little value without internal administration. If the acidity is the cause of the trouble, it is due to the fact of an improper elimination of the acids from the blood and their deposit in the mouth. To remove this locally is but a temporary expedient.

Dr. DONNALLY said we may never have anything that is entirely satisfactory, but this preparation is the best of all we have now, because of its continued action for several hours after application. To remove the cause I have referred my patients to their family physicians. In the case of erosion of the teeth described, six or eight of the teeth were eroded both on the internal and external faces, and in fact every surface had suffered.

On motion, the subject was passed, and the Committee on Oral Surgery was called.

Dr. P. E. SAUER, chairman, introduced Dr. R. H. JONES, of Wilmington, Del., who described a peculiar case of replantation as follows :

A boy five years old was brought to my office with the superior left central knocked out. I told the parents that we would have to wait until the permanent teeth made their appearance. About two years after the accident he came in, and the permanent teeth were just coming through, and the one taking the place of the lost tooth was fractured directly in the center. The fracture extended well up under the gum, and I dismissed the patient, telling him to call occasionally to let me see it, as we would have to wait until the teeth were fully erupted At about the eighth year he called, and I found the fracture filled with the hypertrophied pulp The fracture extended so far under the gum and above the alveolus that I decided to extract the tooth, which I did. I filled the apex of the canal with gold, cut off the broken crown, made a gold band to fit the end of the root, put on a new crown, and replanted the root with the crown in position, secured it firmly in position, and, after waiting two weeks, removed the guard. It has been doing good service for three years.

Dr. M. F. FINLEY reported two cases of epulic tumor as follows :

Case No. 1.—Miss C. presented herself on March 5 with a tumor occupying the interdental space between the second bicuspid and first molar on the lower jaw, left side. The surface of the tumor had a convoluted appearance, and its color was decidedly more red than the adjoining healthy gum ; the slightest pressure or contact by any foreign substance would produce considerable hemorrhage and also some pain. It was this tendency to frequent hemorrhage and the pain incident to contact that induced the patient to seek relief. A probe could be passed under either edge of tumor, as it had a distinct pedicle and was not attached to the gum but had its origin deep down between the teeth ; the growth filled the entire space between the two teeth and extended laterally over the gum septum, forcing it down on both the buccal and lingual surfaces. There was no infiltration of the surrounding gum, showing, I think, plainly that the growth was a benignant one.

The second bicuspid was a pulpless tooth, and was filled on its distal approximal surface.

The operation of treating and filling having been performed about a year ago, the root-canal with gold wire and gutta-percha, the cervical portion of the cavity with base-plate gutta-percha, and the remainder of the cavity with cement, this tooth, previous to being treated and filled, had been in an ulcerated condition for some time and the surrounding parts in an irritated condition. There was a gold filling on the mesial approximal surface of the molar, also a gutta-percha patch at the cervical aspect of this filling; neither of these filled surfaces were smooth, which may have had something to do with keeping up the irritation and tending to an enlargement of the growth.

In removing the tumor I first cut away the buccal portion of it with gum-lancet, and then with a pear-shaped bur in the Davis angular hand-piece burred away the alveolar septum to quite a depth, repeating this procedure on the lingual portion of the growth, then smoothed both gutta-percha fillings with a heated instrument, cleansing the surfaces of the roots of the teeth with instruments; also used trichloracetic acid to aid in this work. These extra precautions of smoothing the fillings and treating the surfaces of the roots of the teeth which had been exposed in the operation were taken with the expectation of letting the second bicuspid remain in the mouth, but at a subsequent sitting it was determined to remove this tooth. After its removal I cut away the septum of alveolus deeper than I had been able to with the tooth in place. I also removed the imperfect filling in the mesial approximal surface of the first molar and inserted a good gold filling. I saw the case one week after the final operation, which was perhaps too soon to be able to say whether the tumor would return, but I hope and think it will not.

Case No. 2.—Mrs. N. presented herself on March 30 with a tumor occupying the interdental space between the first and second molars of the upper jaw, right side. This tumor was very like the first one in its entire presentation, and the tendency to hemorrhage and pain on contact brought the patient to me. Unlike the first case, she was a regular patient, and I am certain that the growth had formed within a few months. The surfaces of the teeth in contact with this tumor were free from defects so far as decay or fillings were concerned. These two teeth had rotated slightly on account of the loss of adjoining teeth, so that the space at the gum-margin was larger than otherwise would have been the case, and there was some pyorrheal trouble, the alveolar septum not standing up to its normal height.

I removed this tumor in the same way as in case No. 1, without, however, extracting either tooth, and saw the patient three weeks after operating; the space or void left by the operation was pretty well filled with new and apparently healthy tissue. I sent a portion of the tissue of this latter tumor to the Army Medical Museum for an examination as to its pathology, but as yet have not received a report upon it.

In the absence of what would be a correct and definite denomination of these growths, I am inclined to classify them as muco-fibrous tumors of a benign nature.

Dr. J. R HAGAN reported a case of fracture of the lower maxillary bone, as follows:

On December 28, I was invited to the Emergency Hospital by Dr. Egleston to see J. H. Arnold, who was suffering with compound fracture of the lower maxillary bone. One fracture was a little to the left of the symphysis, passing almost vertically through the alveolus and basilar process of the bone. This had already begun to unite, as it was the 19th of December when the accident occurred.

The second and much more important fracture started to the left of the symphysis, running downward and backward, terminating almost midway between the symphysis and the groove for the facial artery. Nothing had been done for him except to take a few stitches in an external wound, and wash his mouth with aseptic washes. The left portion of the bone had been drawn upward and inward by the buccinator, masseter, temporal, and pterygoid muscles. The left lower central had been removed, it only being held by the soft tissues.

The first thing to be done was to get an impression. To do this I had an assistant place an instrument between the left lateral and the right central, using the right central as a fulcrum, so that when pressure was put on weight it drew the two fractured ends together. I then took an impression and ran my model. I then passed a gold saw between the first and second bicuspids on both sides, then took very thin platinum plate and made bands for the two second bicuspids and the left lateral and the right central incisor. Then taking a heavy German silver wire, I bent it around inside of all the teeth and soldered to the bands with soft solder. Thinking this would not be strong enough, I added an extra wire and ran soft solder between the wires, making an almost continuous double wire.

After placing in the mouth, I found that the lower right central overlapped the lateral, so that I had to cut the front out of that band. Then when I pressed the appliance in, the muscles drew the left half about one-eighth inch above the right. To obviate this, I passed a silver wire around the central and lateral lower, then passed between the teeth and fastened to the double wires, drawing it in place, and let him go. I saw him every three days for six weeks, when the apparatus was removed. About one month after this I removed a small piece of necrosed bone, after which the wound healed, leaving the articulation perfect.

Dr. J. H. P. Benson read a paper, of which the following is an abstract:

Dental Hygiene in our Schools and Colleges.

The subject of my paper was suggested to me some months ago by the remarks made by several of my patients who had about that time just returned from Europe.

They told me how surprised they were to find American dentists held in such high esteem abroad; and the thought occurred to me, if these intelligent gentlemen knew so little of the accredited skill and eminent standing of their fellow-countrymen in the dental profession, how great must be the lack of information among the masses upon this particular subject.

These, it is true, are only isolated cases, and may amount to nothing so far as proving that the great majority of people are unfamiliar with the history of dentistry or the care and preservation of their teeth, but it created the idea in my mind that there was a need, at least, for instruction among the people in relation to the subject of dentistry, and that in proportion as the people were more broadly instructed in these matters so much more would be their appreciation and greater the value placed upon the service we render them.

It is a fact, I think, that all of us would rather have for our patients people of refinement and education than those who are coarse and illiterate, for we know from experience that with the former our services will be more fully appreciated, and the success of our operations enhanced by the greater attention they give to the care of their teeth ; while with the latter, in the majority of cases, they go to the dentist as they go on an errand of trade. It is strictly business with them, no matter how professional it may all be to the dentist, and they expect a guarantee after you have completed your work that none of their teeth will ever decay again, they having nothing more to do about it, except to lessen the chance of our operations being successful by lapsing back into their former habits of carelessness and neglect in regard to their teeth. It is easily understood just why this is so if we compare the two classes. In the former we have the surroundings of refinement and culture, and the natural accompaniment of these is the strictest regard for all pertaining to personal tidiness, and this necessarily includes attention to the teeth ; while with the latter we find conditions, and results ensuing therefrom, directly at variance with these facts.

Of course this rule is not universal, and there are marked exceptions to its application upon both sides of the question ; nevertheless there are sufficient facts presented in our clinical experience to very nearly justify the conclusion that the care and preservation of the teeth, and the degree of attention bestowed upon the subject, depend to a large extent upon the intelligence and refinement of our patients.

But even with this class we find a large need for instruction, and, broadly considering the matter, I do not think we will overreach the mark in regarding the public a fitting subject for instruction in the laws of dental hygiene.

Various methods have been set forth and adopted to attain this object ; the press has been suggested as a valuable means of imparting this information, also the publication of pamphlets briefly outlining the important points in this connection ; and while there may have been some good accomplished in this way, still, for want of any concerted action upon the part of the profession or official sanction from our societies, there has never been any great amount of good done so far as I am aware. To make the most permanent and beneficial impressions in the knowledge we would impart is the object that the method adopted must have in view, and church and state alike recognize and acknowledge the importance of the early instruction and training of its children in those truths of religion and knowledge which will fit them for becoming worthy and useful citizens.

For, taken at this age the child is most susceptible to impressions, and those made are more lasting. Habits of neatness in regard to attire and personal appearance acquired at this time are often carried into manhood, and as children learn most by observation and copy their elders, it necessarily follows that the habits formed by the child will depend almost entirely upon his home associations and surroundings, modified by the schooling he may get outside of the home circle. Many have acquired habits of culture and refinement by being sent to a good school or college, where they are taught, and learn by the example of others, those graces of good breeding which they had not found at home.

Now it seems to me that the most certain way of accomplishing the greatest good, positively reaching the largest number, and where our instruction would be most profitably given, would be to give our first care and consideration to the children and endeavor to meet them where the surroundings and associations are familiar, and there is surely no more fitting place for this purpose than their schoolrooms If we could have access to our public and private schools, and the privilege of lecturing there upon dental hygiene, and at the same time introducing a small text-book briefly outlining the subject of our instructions, I think we might hope for better results than from any other method heretofore tried. Our instruction would not be limited to the children alone, but would also include the teachers, and indirectly the home-folks of both, as the information imparted would undoubtedly be talked of at home, and would thus arouse an interest in the importance of the subject. We have already in our public schools instruction given in anatomy, physiology, and hygiene, but little mention is made of the care and preservation of the teeth, and it is really a subject of wonder to me that educators and those having charge of institutions of learning have not long ago given this important matter more serious thought and adopted some means of setting forth fuller explanations of the laws of dental hygiene, and recognized the importance of yielding to this special branch a position of more prominence than the slight reference that may now be made to the subject in their text-books.

It but exemplifies the fact, as before remarked, that the need for instruction in all pertaining to dentistry and dental hygiene in particular is not limited to any one class alone, but is a want that is more or less in existence among all classes of people. No doubt, however, if the authorities having control of the various institutions of learning in this and other cities were properly approached and the importance of the subject clearly stated to them, we would find little difficulty in convincing them of the need of inaugurating some such plan as herein suggested, and very likely be accorded the privilege of doing so.

These lectures might be limited to the high schools, and delivered at such times as would be most suitable for having a full attendance of teachers and pupils.

The topics would include, and somewhat enlarge upon, the matter contained in the text-book, one being delivered about every two or three weeks, each succeeding subject taken up until the entire ground had been covered ; four or five lectures a year would likely be more than sufficient ; that, however, would be determined by a closer investigation of the plan and its details. In the intervals between lectures, and in fact during the entire session of the school, the pupils would be pursuing their study of the text-book under the direction of the teachers, dental hygiene being included in the regular routine of studies.

In this way both teacher and pupil would repeatedly have this matter presented to them ; and even if they were indifferent to the subject, they must learn something of it, and many who were before careless in attending to their teeth might be impressed with the folly of their neglect, and aroused to the importance of giving them that attention which their condition demanded.

In our private schools and colleges much the same course might be pursued, only we would have to adapt our plan to suit the various conditions as presented by each individual school.

To accomplish anything in this line, however, demands concerted and official action upon the part of our societies and their members, and if this or some such plan was officially sanctioned and properly presented to the various school and college directors, there can be little doubt, I think, that it would meet with their approval. It is the fashion now for most of the colleges and universities to give free lectures upon subjects of interest and benefit to the public; many of the topics selected for these lectures are entirely outside of their regular curriculum, and the men who deliver them are often not connected with the school at all.

Now, why should not the care and preservation of the teeth, which is of such great importance to every one, be as fitting a topic as any other for these institutions of learning to present to the public? I feel sure, though I do not know it to be a fact, that in the course of these lectures, which are supposed to embrace all the important features essential to the care and preservation of health and the best physical development of the body, no mention was made of the teeth, notwithstanding that it has long since been demonstrated by the dental profession that disease of these organs materially affects the health, comfort, and appearance of the patient. Why not ask these institutions to allow us to present our side of the question, dental hygiene, and its necessity as a factor in the promotion and maintenance of the general health? I am sure the subject could be greatly enlarged upon and be made both interesting and instructive to the public.

Discussion.

Dr. R. H. JONES said much of the blame for the general neglect of the hygiene of the mouth should be laid at the feet of the medical profession, the majority of whom are either woefully ignorant of matters concerning the teeth or are exceedingly careless. He instanced the case of a physician who brought a son to have the first permanent molar extracted, supposing it to be a deciduous tooth. The father had tried to extract the tooth, and was surprised that he could not.

Dr. WILLIAMS DONNALLY said that to teach hygienic habits to children was impossible, except with the aid of their parents and teachers, and even with the help of the teachers its accomplishment would be difficult, because by the time the children go to schools their habits are formed. Still, to teach it in schools was about the most practical plan. It should be taught through text-books and also by occasional lectures to the children. If people realized that contagious diseases were more frequently conveyed through the mouth than in any other way, this might bring them to practice greater care.

Dr. WILLIAM A. MONTELL thought it clearly the duty of the state to educate the children in the needs and wants of hygiene, as there was nothing that could be more important. The best way would be to have a chapter or two on the teeth in the physiologies already used as text-books. The popularization of this knowledge must begin with the younger people, and there seems to be no better way to achieve it than this.

Dr. C. H. BEATTY had visited a number of schools and examined the teeth of the pupils. Many of the mouths he found to be in a filthy condition. He took one child and, having put his mouth in good condition, furnished him with powder and brush and taught him how to use them. The boy followed his directions, and some of the others, seeing the improvement, did the same with good results.

Dr. FINLEY HUNT took special pleasure in hearing such incidents, as they show that we, as a profession, are awaking to the proper idea of our responsibility to the young.

Dr. H. B. NOBLE thought that it indicated that proper steps would soon be taken to improve the general knowledge of these important organs and of the necessary means for their preservation.

Dr. L. ASHLEY FAUGHT said it was well and necessary to get these subjects adequately treated in the text-books used in the schools, but it would be more effective to get the teachers personally interested, so they would exert the influence of their personality with the children for the proper care of the mouth.

Dr. T. S. WATERS had very decided ideas on this subject, and would go farther than parents and teachers; he thought physicians should take the matter in their hands. They have it in their power to do more for the advancement of oral hygiene than any other class. The physician comes in contact with the mother, and could instruct her so that she could strengthen the teeth from the beginning of their development. The physician needs, however, to broaden his own knowledge.

Dr. BENSON, closing the discussion, said that his reason for writing the paper had been the hope that some plan would be brought out by which the work would be forwarded. He felt deeply the great importance of the subject, and that the general knowledge of it was spreading. He wished to be instrumental in aiding its spread.

Dr. R. FINLEY HUNT read the following paper:

THE DENTAL PROFESSION: SOME POINTS IN ITS HISTORY, ITS PRESENT STATUS AND RELATIONS, AND ITS RESPONSIBILITIES AND DUTIES.

As the paper read before the Washington City Dental Society, December 19, 1895, was intended as a means of the much-needed education of members of all classes and professions, including our own, its author has deemed it his duty to continue his labors in that direction by preparing another one embracing some points in the history of the dental profession, its present status and relations, and the consequent duties and responsibilities devolving upon its members individually and collectively.

It is a matter of great regret to the writer that his physical and mental condition and the scant material at his immediate command preclude his giving more than a few points in this history, but he strongly hopes that his feeble effort will incite other and abler persons in the near future to furnish a full and complete history of dentistry and of the Baltimore College of Dental Surgery, which has performed so important a part in developing and bringing to its present condition a profession of which every member thereof may well be proud on account of its achievements in scientific investigation and discoveries, in artistic labors, and in improvements in mechanical inventions and appliances, and in all that tends to the alleviation of the ills that the human race is heir to.

In all times, past and present, there have been and are in our ranks individuals far ahead of their fellows, and whose genius has enabled them to break through the bounds limiting their predecessors and to discover new worlds and domains in science, arts, and mechanics. In the earliest days of dentistry, when it had not yet called to its aid the science requisite to make it a profession, these discoveries were confined mainly to improvements in the art and mechanics of dentistry, and were rare in occurrence and limited in scope, but important as steps toward a higher plane, and the pioneers making them are therefore entitled to a due meed of honor.

The earliest treatise of a scientific character on the human teeth of which the writer has knowledge was published in 1736. There were probably others before this, but the date of the earliest treatise of that character, whatever it may be, is the time at which science began to come to the aid of art in the study and treatment of the diseases of the human teeth. From that time the interest in the scientific aspect of the subject increased, and consequent study and researches resulted in the appearance at intervals of similar treatises and essays. The knowledge and practice derived from these studies and experiments in the science and art of dentistry really formed the *elements* of a profession—existing in a segregated and uncombined state. But, though segregated, these inquisitions into unknown fields and regions of science and art and their results were all tending slowly, surely, and at a constantly accelerated rate to the point and culmination reached in 1836–1840. That period, in the opinion of the writer, marks, by the combination of these elements, the date of the birth of the dental profession,—signalized as it was by the chartering and institution of the Baltimore College of Dental Surgery, the organization of the American Society of Dental Surgeons, and the inauguration of the *American Journal of Dental Science*.

Prior to these events, strenuous efforts had been made by Drs. Horace H. Hayden and Chapin A. Harris to secure the establishment of a dental department in some medical college. Their proposition to that effect was rejected by all the medical colleges to which their application was made. So firmly convinced, however, were these gentlemen of the necessity of giving, in a systematic and practical way, scientific as well as artistic instruction to those intending to practice dentistry, and so determined were they in their resolution to bring their ideas into practical operation, that, undaunted by these failures, they directed their attention and efforts to the institution of an independent dental college. In their efforts they received the aid and co-operation of prominent dentists of New York city. Fourteen of these pledged themselves to pay one hundred dollars per annum each toward the expenses of instituting and conducting the proposed college. The subscriptions were paid for two, if not three, years. The following is a list of the names of these gentlemen: Eleazer Parmly, Jahial Parmly, David N. Park, Solyman Brown, Augustus W. Brown, Isaac N. Greenwood, Elisha Baker, Geo. E. Hawes, Charles C. Allen, John B. Rich, Elijah Bryan, Charles C. Rowell, Patrick Houston, Eleazer Gidney.

Dr. John B. Rich, now practicing in Washington city, is the only survivor of this noble band, and to him the writer is indebted for this and many other facts, Dr. Rich having kindly placed at his service his personal recollections and his library. Dr. Rich has also a list of all the dentists, good, bad, and indifferent, practicing in New York city in 1836, numbering sixty-nine. He is most probably, if not certainly, the only survivor of that number.

The Baltimore College of Dental Surgery was chartered by the legislature of Maryland in 1839, and opened with four professorships, viz, Horace H. Hayden, M.D., Professor of Dental Physiology and Pathology; Chapin A. Harris, M.D., Professor of Practical Dentistry; Thomas E. Bond, Jr., M.D., Professor of Special Pathology and Therapeutics; —— Baxley, M.D., Professor of Anatomy and Physiology.

Dr. Hayden was chosen president of the faculty, and Dr. Bond, dean.

Dr. Hayden continued president until his death in 1844.

The number of dentists in the United States was estimated at that time to be about twelve hundred.

The *American Journal of Dental Science* was inaugurated in 1839, its first number being issued June 1 of that year, under the editorial management of Dr. C. A. Harris, of Baltimore, and Dr. E. Parmly, of New York city. The publishing committee consisted of Drs. Eleazer Parmly, Elisha Baker, and Solyman Brown, all of New York city. Dr. Jahial Parmly, of New York, was made treasurer.

Seventy-six volumes of dental works, extending in date from 1736 to 1836, were placed by Dr. Eleazer Gidney, of New York, at the service of the publishing committee.

On the 18th of August, 1840, a convention assembled in the city of New York for the purpose of forming a National Dental Society, at which were personally present fifteen dentists. At that time there were in existence two local societies,—"The Dental Society of the City of New York," and its auxiliary, "The Dental Association of Western New York."

The convention was organized by selecting Dr. Elisha Baker, of New York, as president, and Dr. Solyman Brown, of New York, as secretary. A committee of three, consisting of Drs. C. A. Harris, S. Brown, and V. Cuyler, was appointed to prepare and report a constitution and by-laws. After a recess, the committee, on the same day, reported a constitution, which was adopted and signed by all the dentists personally present, as follows: Horace H. Hayden, M.D., Baltimore, Md.; Eleazer Parmly, New York, N. Y.; Vernon Cuyler, M.D., Hartford, Conn.; Elisha Baker, New York, N. Y.; John Lovejoy, New York, N. Y.; L. S. Parmly, New Orleans, La.; Chapin A. Harris, M.D., Baltimore, Md.; Charles O. Baker, New York, N. Y.; Patrick Houston, M.D., New York, N. Y.; Enoch Noyes, Baltimore, Md.; Jahail Parmly, New York, N. Y.; Solyman Brown, New York, N. Y.; J. Smith Dodge, New York, N. Y.; Joseph N. Foster, New York, N. Y.; A. Woodruff Brown, New York, N. Y.

The next day a code of by-laws was reported and adopted.

The "American Society of Dental Surgeons," as it was named in the constitution, then completed its organization by electing the following officers: Horace H. Hayden, M.D., Baltimore, president; Josiah F. Flagg, Boston, first vice-president; Eleazer Parmly, New York, second vice-president; E. B. Gardette, Philadelphia, third vice-president; Solyman Brown, M.D., New York, recording secretary; Chapin A. Harris, M.D., Baltimore, corresponding secretary; Elisha Baker, New York, treasurer; Joseph N. Foster, New York, librarian.

The vital importance of this organization to the dental profession is best set forth by Dr. Chapin A. Harris, the Baltimore editor of the *American Journal of Dental Science*, in vol. i, No. 7, in the following words:

"Of the projector of the society, Dr. Hayden, its present president, it may not become us to speak. To the profession, however, having been a member of it for forty-three years, he is well known. As a man of science and an eminent practitioner none stands higher, either in this or any other country. But however distinguished a reputation he may have gained as a dental practitioner or as a man of science, the carrying into successful operation of this project will secure to him a fame that will outlive and outshine even that. When he shall have been forgotten as a dental practitioner and physiologist, he will be remembered by his professional successors as the *father of the American Society of Dental Surgeons.*"

Let us, my professional brethren, make this prophecy true. Let us, who are enjoying the fruits of their unselfish and successful labors, hold in sacred remembrance in our hearts, and place high upon the roll of fame, the names of all those engaged in these noble undertakings, and let us extend a like tribute of honor to those who in subsequent times and in the present day have done so much for our beloved profession.

Thus came into being the dental profession, by the union of its component elements already existing, and the formation of one each of the three great agents of progress and improvement,—the college, the journal, and the society or association. The growth of the new-born profession was at first slow, but acquired greater rapidity in later years. The number of dental colleges has greatly increased; dental journals have multiplied; local, district, and state dental societies—besides the two greater ones, the American Dental and the Southern Dental Associations—have been formed, until now these three great agents are found in all parts of the whole country, doing efficient work in their respective spheres. In addition, very many of the rank and file of the profession are engaged in study, research, and experiments in the science, art, and mechanics of dentistry.

The result of all this is that after the lapse of little more than half a century since the establishment of the first dental college, the first dental society, and the first dental journal, we are known to the world as a learned profession, independent of and co-equal with any and all others,—independent in that, rejected by some, looked down upon by all, and assisted by none, we have, by our own unaided exertions, reached this exalted position; co-equal in that we have combined in our profession, as necessary to its practice, as many sciences and more arts than any other, and in that the researches, as regards character and number in science, arts, and mechanics, made by the members of our profession during its comparatively brief existence, are unsurpassed in the history of the world. Its literature during that time would do honor to any profession.

This is not said in a boasting spirit, but that all may know and appreciate our true standing, which to all intents and purposes has been clearly recognized and defined by the medical profession of this country, by the universities that have established dental departments, and by Congress, and nearly, if not quite, all the state legislatures.

But we must not stop and be satisfied with congratulations and rejoicing at our success. We must realize that while we as a profession have been mounting to our present position, our duties and responsibilities have been increasing with every upward step,—we must constantly remember that nothing less than positive, unavoidable inability will exempt us from the operation of the Divine law, "for unto whomsoever much is given, of him shall much be required," and that with our environments in this age of progress we cannot stand still, nor even falter, without dishonor.

What are these responsibilities and duties? What are we to do to meet the one and perform the other? The answers to these questions, on account of their importance, number, and variety, cannot be given at all fully in the limited space of this paper. The responsibilities lie in the trust committed to our hands. The duties grow out of the proper and faithful execution of that trust. The trust in this case is the further and continued improvement and elevation of our profession. It has attained its present high position by the unselfish devotion and labors of its members, and the same zeal and fidelity will enable us to properly execute this trust. As in the past, so in the future will its organs, the colleges, the societies, and associations, the journals, the boards of examiners, be great powers in the accomplishment of the proposed purpose. With cordial support and encouragement by all members of the profession these should be made the best they can be, but that requires time, patience, and experience. They have done wonderfully well in the past, and will, without doubt, continue to progress as they have done. To those who are not satisfied with their work it is suggested that they have been working in untried fields, and that in forming and expressing an adverse opinion as to their acts each member of the profession should keep fully in view the fallibility of the judgment of human beings, *himself included*.

It would seem proper for the colleges to agree upon a uniform curriculum and standard of admission and graduation, as well as a uniform rule for the admission or exclusion of female students. The writer can see no good reason why they should be excluded, but that is a matter of opinion. He thinks, however, that when they have been graduated they should be allowed to participate *as members* in the benefits derived from the labors and discussions of dental societies. Any other course is hardly consistent with the present positions maintained by the profession, and the diplomas held by female graduates should entitle them to the same rights and privileges accorded to male graduates.

Our studies have hitherto been confined to conditions and symptoms. In the practice of our profession we are called upon to treat pathological conditions of the oral cavity, and to find and apply remedies to them. These conditions seem to have been regarded, until recently, as to a great extent purely local, and the remedies applied have accordingly been mainly local and direct; and it seems that the fact has been overlooked that, as no effect can exist without a cause, there must therefore be causes for these conditions, and that the true course would be, in addition to the indicated local treatment, to trace out as far as possible and remove these causes, in obedience to the well-established law, "sublatâ causâ, tollitur effectus,"—"the cause being removed, the effect ceases."

In so doing we are brought face to face with the fact that in the physical human being we have a marvelous, complex, and delicate self-acting chemical laboratory and manufactory, in which the processes of analysis and synthesis are continually in operation, converting the food-material furnished to it into tissues, forming these tissues into organs, and uniting all in the shape of the fully-formed human being. The conclusion is inevitable that, as in all chemical operations, these processes are governed by *conditions precedent* and *chemical laws*, resulting in the production of the various tissues and organs, each with its definite function. The chemical laws were established by an Allwise Supreme Being, and are constant and unvarying in their action. The conditions precedent necessary to the production of a healthy human being have been definitely fixed by the same infinite wisdom, and the duty of bringing them into proper co-operation with the chemical laws and of supplying the material in the shape of food for their joint action has been assigned to man, to whom intelligence and reason were given to guide him in the performance of that duty.

As chemical laws act with unvarying certainty, the character of the tissues and organs and their functions, whether normal or abnormal, is controlled by the compliance or non-compliance with the conditions precedent. Of course a non-compliance with the conditions precedent causes a degeneracy of the tissues and organs, and therefore a derangement of the systemic functions, which is manifested either in a general disturbance or in the abnormal condition and action of local tissues. Hence the conclusion is justifiable that, as a rule, *local diseases are the local expressions of systemic functional derangement*, determined each to its locality by circumstances of which at present we have insufficient knowledge. The principal of the conditions precedent are the inheritance of a good constitution, an adequate supply of pure air for its oxygen, plenty of sunlight for its actinic action, abundant exercise in the open air, and a good supply of proper food. The nature of the food required is largely determined by the habitat, the inhabitants of the arctic regions requiring an animal diet, and those of the tropics a vegetable one.

In an abnormal state of the tissues, organs, and functions, the human system readily succumbs to the attacks of disease. In a thoroughly normal state the ability to resist disease is astonishing and amounts almost to immunity, even from contagions and epidemics.

The statement of these positions is left to you with an expression of the belief that it is the duty of the members of our profession to investigate them thoroughly, and to act, in their treatment of the diseases of the teeth and oral cavity, in all their correlations, in accordance with the result of their investigations.

The paper now submitted is necessarily incomplete for want of time and space. It is suggestive on two points—first, that a full history of dentistry in its two states, elemental and organized, should be written at an early day; second, that the views and conclusions contained in the latter part may point to a material change, to a more distinctly hygienic and prophylactic treatment of diseases coming under our care.

In conclusion, the ardent hope is expressed that each and every member of the profession will unselfishly and faithfully perform his official and individual duties, always recognizing and appreciating the truth that, in the attainment of our ends, union of effort and harmony of action offer the best means of success.

Discussion.

Dr. L. ASHLEY FAUGHT said that he regarded this as a very important paper, and that it was a very important thing that the history of the profession should be gathered up from where it is now scattered through our literature. The facts should be collected, and a complete history be written at as early a date as possible.

Dr. H. B. NOBLE agreed as to the importance of the paper, as it recorded many facts that were to the majority of our profession unknown. He hoped that at an early date a full history of dentistry would be published.

Dr. B. HOLLY SMITH moved that the Maryland State Dental Association and the Washington City Dental Society, in joint session assembled, memorialize and petition the American Dental Association and the Southern Dental Association to appoint a committee of three from each, these to name one or more such person or persons as they deem best fitted to prepare and have published a history of dentistry to date, at the joint expense of the two associations.

The motion passed, and the convention adjourned to meet at 3.30 P.M.

(To be continued.)

MARYLAND STATE DENTAL ASSOCIATION.

AT the last business meeting of the Maryland State Dental Association, the following officers were elected for 1896–97: T. S. Waters, president; M. G. Sykes, first vice-president; D. Malcolm, second vice-president; F. F. Drew, recording secretary; W. W. Dunbracco, corresponding secretary; J. G. Heuisler, treasurer; C. M. Gingrich, C. C. Harris, Marshall Smith, executive committee.

F. F. DREW, *Rec. Sec.*,
701 N. Howard st., Baltimore, Md.

NEW JERSEY STATE DENTAL SOCIETY.

AT the annual meeting of the New Jersey State Dental Society, held at Asbury Park, N. J., July 29 to 31, 1896, the following officers were elected for the year 1896–97: Harvey Iredell, New Brunswick,

president; J. W. Crater, Orange, vice-president; Charles A. Meeker, Newark, secretary; Geo. C Brown, Elizabeth, treasurer; Oscar Adelberg, Elizabeth, Wm. P. Richards, Orange, J. A. Osmun, Newark, H. S. Sutphen, Newark, executive committee; F. C. Barlow, Jersey City, president, G. Carleton Brown, Elizabeth, secretary, E. M. Beesley, Belvidere, Geo. Emery Adams, South Orange, Charles A. Meeker, Newark, examining board.

NATIONAL SCHOOL OF DENTAL TECHNICS.

THE second annual meeting of the National School of Dental Technics was held at the Grand Union Hotel, Saratoga, commencing Monday, August 3, 1896. A number of papers were read and discussed; and many interesting and instructive exhibits were made by the various schools. The following were elected officers for the ensuing year: Henry W. Morgan, Nashville, Tenn., president; S. H. Guilford, Philadelphia, Pa., vice-president; John F. Stephan, Cleveland, O., secretary-treasurer; George H. Wilson, Cleveland, O., member of executive board.

MONTANA STATE DENTAL ASSOCIATION.

THE second annual meeting of the Montana State Dental Association was held at Butte City, July 30, 1896. The following officers were elected: J. W. Reed, Butte, president; C. H. Head, Helena, first vice-president; R. M. Leslie, Livingston, second vice-president; F. B. Norris, Helena, recording secretary; T. M. Hampton, Helena, treasurer.

F. B. NORRIS, *Secy.*

DENTAL COLLEGE COMMENCEMENTS.

TACOMA COLLEGE OF DENTAL SURGERY.

THE first annual commencement exercises of the Tacoma College of Dental Surgery were held in the Reception Room, Chamber of Commerce, Tacoma, Wash., on Tuesday evening, March 31, 1896.

The address on behalf of the faculty was delivered by J. M. Meyer, D.D.S., dean, and that on behalf of the graduating class by R. E. L. Newberne, M.D. An address was also delivered by E. A. Burns, M.D.

The number of matriculates for the session was twenty-six.

The degree of D.D.S. was conferred on the following graduates by James R. Yocom, M.D., president of the college: David I. Burkhart, Tacoma, Wash.; Julian W. Clymer, Oregon; Robert E. L. Newberne, M.D., District of Columbia.

UNIVERSITY OF CALIFORNIA—COLLEGE OF DENTISTRY.

THE annual commencement exercises of the College of Dentistry of the University of California were held in Odd Fellows' Hall, San Francisco, Cal., on Thursday evening, June 18, 1896.

The faculty address was delivered by Professor John M. Williamson, M.D.

The number of matriculates for the session was one hundred and ninety-seven.

The degree of D.D.S. was conferred on the following graduates by Martin Kellogg, A.M., LL.D., president of the university :

William H. Abbay.
Henry Abrahm.
George Abrams.
Marilda J. Ayers.
Frederick G. Baird.
Mary L. Baird.
Bertram C. Boeseke.
Franklin C. Bonnel.
Charles H. Bowman.
Albert Caferata.
Paul T. Carrington.
Harry G. Chappel.
William N. Clark.
Frank H. Cranz.
Jacob Cohn.
Stephen J. Cunningham.
William E. Davis.
James M. Forrest, Jr.
Arthur A. Fowler.
H. Edward Gedge.
Amy M. Gilbert.
Charles D. Gilman.
Lawrence Greenbaum.
Richard G. C. Harms.
Charles E. Hart.
Arthur P. Harth.
George M. Harris.
Alexander H. Hawley.
George H. Haynes.
Samuel W. Hilliard.
Guy B. Husted.
Konrad M. Lundborg.
Stephen C. Maynard.
Naoma G. MacDonald.
Robert B. McNutt.
Thomas S. Morden.
Fred G. Pless.
Charles B. Porter, Jr.
Joseph I. Richards.
Leon J. Roth.
Anna M. Sawyer.
John H. Seager, A.B.
Frank J. Smith.
George E. Stallman.
Benjamin M. Stich.
Montgomery Thomas.
Oscar Tobriner.
Clifford Todd.
William H. Ware.
Lauren D. Webster.
Clyde A. Weldon.
Edward W. Westphal.

UNIVERSITY OF MICHIGAN—DENTAL DEPARTMENT.

THE annual commencement exercises of the College of Dental Surgery of the University of Michigan were held, in connection with those of the other departments of the university, at Ann Arbor, Mich., on Thursday, June 25, 1895.

The commencement oration was delivered by Charles Kendall Adams, LL.D.

The number of matriculates for the session was one hundred and seventy-seven.

The degree of D.D.S. was conferred on the following graduates :

Elmer H. Argetsinger.
Frank C. Arnold.
Jay C. Arnold.
Frank M. Bacon.
Clarence H. Bailey.
John W. Bass
Eddie W. Brown.
Edward D. Brown.
Robert R. Buckthorpe.
Harry S. Buell.
George F. Burke.
Willis H. Buttolph.
Jessie E. Castle.
James N. Clarke.
Charles W. Cleaver,
Jonathan P. Collett, B. S. National Normal Univ.
Irving W. Copeland.
Ernest F. Day.
George L. David.
Edward V. Deans.
Charles A. Devlin.
Stanford J. Farnum.
Stanley A. Farnum.
Charles F. Fitch.
Fred. A. Graham.
Fred. J. Hale.
Hector Hillman.
Cleveland A. Houghton.
Burton T. Hunt.
Charles L. Kemery.
Vernor J. Lathrop.
John A. Lentz, LL.B.
Howard J. Livingston.
James W. Lyons.
Thomas S. Mann.
Samuel S. Mummery.
James H. O'Toole.
Charles A. Phillips.
Ross Porter.
Frank G. Powers.
Herman Prinz.
C. A. Quackenbush.
James Robins.
William H. Roper.
Thomas F. Sheridan.
Charles L. Sherwood.
Charles E. Slagle.
Albert L. Smith.
William J. Stapish.
Morley P. Templar.
Wilber Townsend.
Albertus Van Ark.
Charles A. Wehe.
Ralph L. Williams.
Raymond L. Williams.
William P. Winning.
Robert M. Woodin.
George H. Wooton.
John A. Wooton.
Percy B. Wright.

EDITORIAL.

EXACTNESS.

THE quality of exactness is an essential factor of all phenomena concerned in human development and the progress of the race. It is a characteristic of natural processes, having its most general expression in the laws of the conservation of energy and the correlation of force. The tendency toward equilibrium in the operation of nature's forces is everywhere manifest, and the results of these are always repeated with unerring accuracy where the same conditions obtain. In nature's workshops and laboratories there is no such thing as a "full inch" or a "scant inch;" her determinations of weight, volume, and extent are absolute. The failure to appreciate this quality of exactness in the world of activities about us leads to inharmony and error, which more than anything else hinder and retard our progress toward higher planes of living. The correct interpretation and understanding of nature requires exactness in methods of study, and this exactness of method in the study of nature is the scientific method, its aim is the acquisition of absolute knowledge or science.

It has been truly said by Professor Huxley that scientific knowledge differs from common knowledge only in the matter of its accuracy. Scientific investigation is therefore simply an exact method of study under conditions whereby all chances of error are eliminated.

The desirability of acquiring exact knowledge in all lines of human inquiry cannot be questioned. This is admitted for all of the physical sciences and perhaps for all other departments of study, but the degree in which the general principle is practically applied to the study of our own specialty is lamentably and notoriously meager as compared with the need for it and the importance of the field to be studied. It is no doubt an unalterable condition of our educational system that every student entering upon the study of dentistry regards it primarily as a means of securing a livelihood, as in fact it is. His stimulus to study is the promise which it holds out of making him a self-supporting individual. It is this central motive power which excites his interest in any new device or method. If it be a labor- or a pain-saving device, he may comfort his conscience with the belief that it is for the benefit of his patients, and, stopping there, refuse to admit that the indirect result, the increase of business which its adoption will work for him, is, after all, the ultimate object which he seeks and the mainspring of his interest in it. In so far as such a motive in professional life is a factor in the production of good it is by no means to be despised any more than policy, which, in the absence of a higher motive, induces certain men to be honest.

But that product of a higher evolution, the spirit of altruism, which, if self-preservation is the first, is certainly the second and therefore more important law of nature, demands something more of the individual than that he shall be self-supporting and careful only of the factors which make for his own betterment. Civilization has reached a point where a care and consideration for the welfare of others is demanded of all men, and none are exempt. Each member of our calling owes something to the profession through which he gains his subsistence. What his contribution to the common fund shall be depends upon his individual abilities rather than upon his opportunities, as these latter are boundless. The factors which have helped humanity most are ideas, suggestions based in truth and given to the world, that their practical value might be generally utilized. The crying need of dentistry to-day is for more men interested in the scientific development of our calling. Every department of it suffers from lack of more accurate investigation of the causes underlying its phenomena. It is too generally the belief that what has been dignified by the name of scientific research is a possibility only to those who are endowed with peculiar mental powers and who have had exceptional opportunities for education. This, broadly speaking, is an error ; research is merely inquiry, and it becomes scientific in proportion as it becomes accurate and exact in its method. Scientific research is therefore a possibility for any one who is willing to work in accordance with exact methods, and there is no way by which so much benefit to dentistry can be achieved as by additions to its stock of scientific results. It is true that peculiar fitness for scientific research is possessed by comparatively few, at least but few give evidence of it ; but the habit of observation and accurate interpretation may be acquired, so that each in his degree may add something of importance to the common stock of knowledge. If these tendencies were more carefully cultivated by the members of our profession, it would work an improvement all around. The transactions of our professional organizations give pitiful evidence of lack of accuracy of observation among many of those who report their findings before those bodies. As a consequence, much time that is too valuable to be so wasted is used up in correcting the errors which arise in consequence of the lack of exactness noted. An equally undesirable result is the amount of space in our journals which even the abstracted reports of such proceedings occupy, and which could be more advantageously devoted to more valuable matter. A common cause of the error alluded to is the tendency to draw definite conclusions from conditions which have no real existence, to read into our observations of phenomena factors which have only an imaginative relation to them and are without foundation in fact. Errors of this class have a persistence and stability which whole volumes of truth are often powerless to overcome.

The realms of physical investigation are by no means the only departments of life which suffer from the result of a lack of exactness. This same source of error creeps into the ethical relationships of men, and our profession is by no means exempt from its effects. Motives are imputed, actions are falsely interpreted, and character assailed upon the basis of hearsay or meager knowledge, which a correct observation and investigation would show to be entirely without foundation. But truth does not reveal itself spontaneously always, and much of it that is hidden requires an effort upon the part of the investigator to bring it to light. As it is easier for the lazy individual to accept the error than to dig out the truth, the error naturally flourishes until, like certain micro-organisms, it perishes in the excess of its own waste products.

Much may be done in a corrective way toward eliminating the source of error under consideration, by so training the student that he will develop a respect and admiration for the exactness of nature during his college course. It should have been a part of his training from infancy, but many of our educational methods are in themselves imperfect, or have been imperfectly applied, so that a proper respect for precision and accuracy is lacking in the student just entering upon his professional course. The whole structure of his technical education will rest upon an insecure foundation if this defect remains uncorrected. There is no calling which is more exacting in its demands for accuracy and thoroughness than dentistry. Good work, lasting results are only possible where certain uncompromising conditions are faithfully and precisely met. On the other hand, the opportunities for slighting the character of an operation are almost equally great, hence the successful operator comes to be his own critic and severest judge. Unless he has developed a love of truth and accuracy to such a high degree that he is willing to cheerfully meet these conditions, he becomes a detriment to his profession and a dishonor to his colleagues.

It is easily within the province of the dental educator to so shape the methods of his instruction as to make them the means for a proper attitude toward these matters. The stimulus toward exactness in all things professional should be interwoven throughout the whole fabric of the college course. And if teachers generally become imbued with the desirability, nay the necessity, for such training, a lasting benefit to our profession must certainly result.

DENTAL HISTORY.

We present two suggestive papers upon Dental History in this issue, which embody some points not heretofore published.

The history of dentistry has not yet been written, but it ought to be. The time is propitious, and the longer it is delayed the more difficult it will be to secure a reliable result. An effort was made in connection with the World's Columbian Dental Congress to secure a history of American dentistry, but the result has not yet materialized. No single author could probably accomplish the task, but if a properly organized and concerted effort were made the result could no doubt be attained. Let us hope that a creditable history of dentistry, not only of America but of the whole world, may soon be forthcoming.

PAST THE HALF-CENTURY MARK.

A notable fact in connection with the late meeting of the American Dental Association was the attendance upon its sessions of four men who have been in honorable and honored practice for a full half-century or more: Corydon Palmer began the practice of dentistry in 1839; Jonathan Taft in 1842; Jesse C. Green in 1843; William H. Morgan in 1846.

OBITUARY.

DR. CHARLES DE C. BROWN.

Died, in New York city, July 12, 1896, of heart-disease, Dr. Charles De Costa Brown, in the eightieth year of his age.

Dr. Brown was born in Philadelphia, March 3, 1817, where he received his early education. Later he was graduated from the medical department of the University of Pennsylvania, and began practice in Philadelphia. In 1850 he went to New York and took up the study of dentistry. He soon built up a good practice in that speciality. He was associated in practice with his brother Dr. J. Brown until the death of the latter in 1879.

In war times Dr. Brown was appointed government embalmer by Secretary Stanton, and embalmed the bodies of President Lincoln, of General Phil. Kearney, and of several other celebrated men.

Dr. Brown was an earnest worker, and was well read in general literature as well as that of his profession. He was at one time a school trustee in the Fifteenth Ward of New York. He was a prominent Mason, having attained the thirty-third degree in that order, and always took an active interest in whatever pertained to the progress of the fraternity.

Sixty years ago Dr. Brown was married to Miss Maria L. Knorr, of Philadelphia, and she and four children survive him. His remains were interred at Greenwood.

DR. C. CUTLER SMITH.

DIED, at Ilion, N. Y., July 9, 1896, after a brief illness, Dr. C. CUTLER SMITH, in the forty-ninth year of his age.

Dr. Smith was born at Unadilla Forks, N. Y., October 9, 1847. After a public school education, he entered Colgate University, at Hamilton, N. Y. While pursuing his studies there he formed an acquaintance and lasting friendship with a young student named Hurd, whose father was at that time a dental practitioner of high standing in Brooklyn, N. Y. He passed a dental pupilage of three years with Dr. Hurd.

In 1868 Dr. Smith went to Ilion, N. Y., and opened an office for practice, which he conducted with close attention and skill for about twenty-eight years. He had an extended and eminently successful practice. He was enthusiastic in the progress of his profession; was a member of the District Dental Society, and was repeatedly honored by official positions therein.

Dr. Smith was a member of the Masonic fraternity, and his funeral was conducted in accordance with the impressive ceremonies of that order.

DR. A. S. KIDDER.

DIED, in New York city, July 5, 1896, of phthisis, Dr. AUGUSTUS S. KIDDER, in the fifty-sixth year of his age.

Dr. Kidder was born at Claremont, N. H., July 19, 1840. His father, Dr. Frederic T. Kidder, was a dentist there. After a public school education, he entered Dartmouth College, from which institution he was subsequently graduated. He then commenced the study of dentistry with his uncle, Dr. James H. Kidder, of Lawrence, Mass.; graduated from the Pennsylvania College of Dental Surgery in 1862; after which he went to New York and associated with Dr. Norman W. Kingsley, then with Dr. William H. Dwinelle (a blood relation to him), and subsequently with his cousin, Dr. Joseph Walbridge. In 1868 he went into practice for himself. He was a member of the First District Dental Society.

Dr. Kidder was married in 1866 to Miss Josephine Harvey, of Williamsport, Pa. Mrs. Kidder died in June, 1894. One daughter survives him.

RESOLUTIONS ON DEATH OF DR. W. E. MAGILL.

AT a meeting of the Pennsylvania State Dental Examining Board, held at Bellefonte, Pa., July 8, 1896, the following preamble and resolutions were passed:

WHEREAS, It has pleased our Heavenly Father to call our friend and president, Dr. William E. Magill, from his earthly labors, which he so faithfully and conscientiously performed, to the eternal home where "they rest from their labors," therefore be it

Resolved, That we, the Pennsylvania State Board of Dental Examiners, in session assembled, record our deep sense of the loss which the Pennsylvania State Dental Society and this Board in particular has sustained; and further be it

Resolved, That he was faithful in friendship, generous in deeds, equable and just to all men, kindly and sympathetic in his nature, a wise counselor, and that a high sense of honor and consistency at all times characterized his public, professional, and private life; and be it further

Resolved, That we extend our heartfelt sympathy and sorrow to the bereaved family, and that these resolutions be spread upon our minutes and published in the DENTAL COSMOS, and a copy thereof be sent to the family.

C. S. BECK,
L. ASHLEY FAUGHT,
Committee.

Attest, J. C. GREEN, *Secretary.*

HINTS, QUERIES, AND COMMENTS.

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—I am a young man just passing through the school of experience (for fifteen years), and have been inveigled into many practices, all of which have not proved eminently successful; among them "practice" upon the pulp and with the pulp-canal, such as capping of suppurative pulps, amputation of part of one putrescent, *and the fallacy of allowing to remain in the pulp-canal part of a devitalized pulp.*

Dr. Flickinger (in July, 1896, DENTAL COSMOS, page 556) concludes with three objectionable paragraphs, especially the paragraph that "fruit is successfully canned *and sealed*, wine bottled *and sealed* (italics mine)—the older it gets the better,—bodies are preserved for centuries; why can we not seal up a small part of a pulp so as to cause no further trouble?" *Does he seal up that small part?*

If the doctor would but give himself a chance to think, he would admit for himself the inconsistency, to say the least, of his remarks in the final paragraph. The article to that point I heartily indorse, but I take exception to leaving any portion of pulp in a tooth and even dreaming of positive success.

When it is left in the pulp-canal from any cause whatever, just in proportion to the size of filament left there is it relative to the trouble which is liable to follow.

Fruit and wine are preserved *and sealed*, yes, hermetically, with no little vent existing allowing the passage by infiltration or displacement of germ-laden air or fluid containing a pyogenic corpuscle or two.

In the case of the anciently preserved cadaver, experiments since have proven (and it needs little to verify the statement) that if the action of the mummifying agent be circumscribed, say by ligating thoroughly part of the mass to be acted upon so as to prevent the passage of the agent used, only the part free to the circulation of the agent will be mummified, the other will undergo decomposition if in contact with the air; and if the whole mass (even to a mummified cadaver) be laid in a stream of water or a wet quarter, the whole will disintegrate.

Who of us has not recognized the arsenically capped pulp which apparently has given no trouble for years (maybe), but questioning brings forth a history of neuralgia, peculiar to that character of treatment, or some facial disturbance? The pulp-chamber opened; yes, we find a mummified pulp, *suspended in moisture.* Of course it is easy to determine where the moisture came from. There is no *vile* odor of putrescence there, but the peculiar enervating neuralgic disturbance that that character of pulpless tooth creates should be avoided.

Happily, those cases respond to conservative treatment.

To incorporate with our root-canal fillings, which are presumably to be permanent, such irritants as arsenious acid, seems like courting the same results as our fathers in dentistry obtained, which to-day we designate as poor practice on their part.

Disguising the "wolf" by putting on it a "*suit of clothing*," such as alum, thymol, glycerol, oxid of zinc, etc., is as if arsenic was not arsenic under any conditions, only some are averse to stuffing the whole pulp-chamber and canals with it *and leaving it there* and telling about it.

It seems to me most reasonable to suppose that the stream of—say, only the watery part of the blood reaches the part—serumal fluid which constantly flows about the apical region of a pulpless tooth will attack in time even the small filament left there, as it does the whole pulp (which we know it will), that was presumably mummified a short (or longer) time before by the application of *and sealing in* of some arsenical preparation, while the "old school" was "practicing."

Arsenic is a most important adjunct in our list of medicaments, but it is one of those remedies that must be handled with absolute caution and conservatism. All of us, too, must leave some filaments of pulps in root-canals at times, but the success of those cases is mere conjecture only.

Human nature is too liable to swallow the whole pill and then lick the sugar out of the box, until, later on, it gives them what,—the cathartics?—LOUIS C. LE ROY.

SOFT TEETH, ETC.—Recent researches show that the calcifying of teeth is practically uniform; that is to say that the proportion of lime-salts does not vary to any appreciable extent in different specimens, and that "differences in susceptibility to caries are in all reasonable probability from without, and are conditions that are well known to be variable or changeable."

What are outward causes or conditions? Acids simply, bacteria being only factors in their production, and having no direct action of their own on enamel.

Acids and acids alone are capable of disintegrating the enamel by dissolving the lime-salts. Acids owe their presence to external, internal, or local causes; external introduced by foods, internal by systemic diseases, such as eructations caused in dyspepsia, etc., local acidity of salivary glands, mucous glands, etc.

Of late the supreme importance of acids has been neglected. Dr. Miller, and others before and after him, have practically demonstrated their mode of action. "The fluids of the mouth, the fluids of the body," Dr. Black exclaims; and Dr. Burchard in October DENTAL COSMOS, 1895, said "that the origin of salivary calculus is due to the action of lactic acid upon the secretions of the salivary glands, and the glands of the oral mucous membrane, and its prevention is essentially the prevention of the formation of lactic acid. *It will be also seen that the same therapeusis is the prevention of dental caries.*"

The changing of the susceptibility to caries, etc., can in nearly all cases be attributed to the fluctuations consequent on the presence, increase, or absence of acid. Apply it, for instance, to the periods when decay is most present, as given by Dr. Inglis in his Dental Pathology and Therapeutics.

Periods of Decay (approximately):

1. 5 to 8 years. Systemic effects of diseases of childhood.
2. 12 to 20 years. Undue growth.
3. 30 to 35 years. Family and business cares.

In first period most diseases of childhood cause acidity of mouth fluids; second, undue growth, attended by disturbance of the nervous system; and three has the same effect. Of course, subsequent to the fluids of the mouth becoming abnormal there is a greater increase of introduced acids, as they are not neutralized by an alkaline normal saliva. Present life, its increasing wear and tear, its conditions and habits, immensely increases disturbances of the nervous system, and directly it is run down or taxed unduly, the fluids of the mouth become abnormal and acid. Astonishing results, both as regards the checking of softening enamel, protection from decay, calculi, preservation of fillings, and decrease in the electrical conductivity between active fillings, follow the use of thorough anti-acid therapeusis.

Some gentleman in a late meeting of the New York Odontological Society exclaims dogmatically, "No man lives that can lap over a delicate margin of a white soft tooth, and protect it with anything but gold." I have seen fillings of the much despised and wrangled copper amalgam in perfect condition in such cases. And while speaking of this material, I think the disputed ground about the setting of this alloy will be found somehow to be effected by acids. Anyhow, as far as I have observed, the more acid the condition of the mouth the better and blacker it seems to set.

Where the patient cannot be persuaded to take proper anti-acid precautions, and there are acid conditions, this seems to be the most effective material,—of course, only in posterior teeth.

The study of acids, their properties and effects, has not yet been nearly completed, and this short paper has been but a reminder of the possible and most probable greatness of their importance. On the enamel walls, the bulwark and defence of the tender and sensitive dentine, the terrible and ceaseless onslaught of the germs is resisted till the end. The faithful enamel particles stand invincible to all attacks till acid, the awful ally to the micro-organisms, subtly sinks into its softened surface, and, atom by atom, molecule by molecule, its walls dissolve away. A breach is formed, and myriads of eager microbes flock to make a dwelling-house of this vanquished citadel. Thus encamped they carry on their war with increased rapidity and vigor.

Hence, once more I would draw attention to the necessity of thorough anti-acid therapeusis, not mild, but thorough, with a sufficient basal preponderance of an anti-acid which will be sweeping in its effect.— ARTHUR KNIGHT, Sydney, N. S. W.

A QUICKLY EXTEMPORIZED TOOTH-CROWN.—At a meeting of the Second District Dental Society, held in Brooklyn, April 8, 1895, Dr. F. T. Van Woert presented the following novel method of quickly making a porcelain crown in an emergency case. A gentleman called at his office a short while ago, early in the evening, having just broken a central Logan crown. He was going to a wedding that same evening, and said that a new crown must be supplied. The dental depots were closed, and there was no way of obtaining another crown suitable to the case at such short notice. The pin was easily and quickly removed from the root, and an impression with modeling compound was taken, into which quick-setting plaster was poured. A dowel was selected, the projecting end of which was split for a short distance and the parts bent over at a right angle. A rubber tooth was then ground to position on the plaster model. With the tooth and dowel in place on the model, the bent-over ends of the dowel extending to just below the pins of the tooth, fusible metal was melted over the end of the root exposed and against the palatal surface of the tooth. While still fluid it was pressed with a piece of chamois skin so as to fill the space between the end of the root and the shoulder on the tooth above the pins. This was quickly cooled, removed from the model, trimmed and polished. The fit was accurate, the metal having gone absolutely to place, so that it could be finished with perfect edges, and the result was a very strong and beautiful crown. The whole operation was so quickly performed that twenty-five minutes after his first appearance at the office the gentleman departed with the new crown in position. Dr. Van Woert demonstrated this case at the meeting by making another crown on the same cast in ten minutes.

◆

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

The abbreviations of titles used are those common to bibliographical work, and will, it is presumed, be readily comprehended by any one familiar with dental or scientific publications. Any explanation will be gladly furnished by the compiler. A star (*) indicates a Thesis.

Benoît (C.) * Du gaïacol et de la cocaïne considérés comme anesthésiques locaux. Paris, 1896, H. Jouve. 4°.

Camoin (Jules.) Application de l'électricité à l'art dentaire. Marseille, 1896, imp. Schickler, 8 p., 2 pl. 8°.

Geist-Jacobi (G. P.) Geschichte der Zahnheilkunde vom Jahre 3700 v. Chr. bis zur Gegenwart. Tübingen, 1896, F. Pietzcker, 254 p., 1 pl. 8°.

Hayden (William R.) History of anæsthesia: or painless surgery. [*Reprint from:* Internat. J. Surg.] New York, 1896, 51 p., 5 pl. 12°.

Kollbrünner (Emil.) * Ueber totale Verwachsung des Weichens Gaumens mit der hintern Pharynxwand. Strassburg, 1896, 59 p. 8°.

Lange (R.) Ueber heutiges Gebiss und seine naturliche Erhaltung zur Vermeidung frühzeitig künstlicher Zähne. 2. Aufl. Zittau, 1896, Pahl., iv, 46 p. 8°.

Mela (R.) I denti e la dentizione in rapporti alla medicina legale. Genova, [1896], stab. tip. Morando. 8°.

Minelle (Louis-Joseph-Pierre.) * Contribution à l'étude des myxomes de la parotide. Orléans, Paris, 1896, Steinheil, 66 p. 4°.

Nux (Louis.) Manuel pratique de dentisterie opératoire à l'usage des médecins. 2. éd. Paris, 1896, O. Doin, 200 p. 8°.

---

d'Almen. De l'emploi du permanganate de chaux en chirurgie dentaire. Odontologie, Par., 1896, 2. s., iii, 257-262.—**Arslan** (Y.) Contributo allo studio dei tumori delle tonsille. Boll. d. mal. d. orecchio, d. gola e d. naso, Firenze, 1896, xiv, 73-81.—**Ascoli** (C.) Sullo sviluppo del dente del giudizio nei criminali. Arch. di psichiat. [etc.], Torino, 1896, xvii, 205-209.—**Aubeau.** Sarcomes myéloïdes du maxillaire supérieur. Rev. odontol., Par., 1896, xxxvii, 249-269.—**Austin** (H.) Some effects of the specific infectious fevers upon the mouth. Dental Rec., Lond., 1896, xvi, 241-249.—**Baber** (E. C.) Notes on the diagnosis of latent abscess of the maxillary antrum. Brit. M. J., Lond., 1896, i, 1552.—**Barling** (G.) Removal of myxo-sarcoma growing from the basic sphenoid by splitting the palate. Tri-State M. J., St. Louis, 1896, iii, 238.—**Beco** (L.) Contribution à l'étude de la stomatite diphtéroïde infantile. Arch. de méd. expér. et d'anat. path., Par., 1896, viii, 433-444.—**Black** (G. V.) Amalgam and amalgam fillings again. Dental Pract. & Adv., Buffalo, 1896, xxvii, 120-124.—**Blanc.** Epithéliome de la langue greffé sur d'anciennes plaques de leucoplasie; amputation de l'organe; pas de recidive trois ans après l'opération. Loire méd., St. Etienne, 1896, xv, 142.—**Boulay.** Crises épileptiformes et hypertrophie des amygdales.

Arch. internat. de laryngol. [etc.], Par., 1896, 206-209.—**Caris** (W. I.) Electricity; its use for producing local anæsthesia by cataphoresis. Ohio Dent. J., Toledo, 1896, xvi, 320-329.—**Carter** (R. B.) Note on eucaine as a local anæsthetic. Lancet, Lond., 1896, ii, 107.—**Chérot.** Kyste du maxillaire supérieur consécutif à une arthrite dentaire. J. d. sc. méd. de Lille, 1896, i, 615-619.—**Cigrand** (B. J.) A safe and serviceable detachable bridge-denture. Ohio Dent. J., Toledo, 1896, xvi, 316-319.—**Cobb** (F. C.) Empyema of the antrum of Highmore. Internat. Dent. J., Phila., 1896, xvii, 405-418.—**Cool** (R. H.) Alveolar abscess. Pacific Stomatol. Gaz., San Fran., 1896, iv, 166-170. [Discussion], 179-188.—**Courtade** (A.) Troubles de la déglutition d'origine mycosique. J. de méd. de Par., 1896, 2. s., viii, 285.—**Coville & Lenoble** (E.) Evolution anormale de la dent de Sagesse. Presse méd., Par., 1896, 300.—**Cravens** (J. E.) Progressive calcification. Ohio Dent. J., Toledo, 1896, xvi, 329-334.—**Dents de rhinocéros.** [Discussion.] Bull. Soc. d'anthrop. de Par., 1896, 4. s., vii, 37-48.—**Depage.** Ablation de la langue avec trachéotomie préventive. Soc. roy. d. sc. méd. et nat. de Brux. Bull., 1896, 49.—**Devlin** (C. A.) Impression materials, and how to use them to attain the best results. Dental J., Ann Arbor, 1896, v, 95-103.—**Dunbar** (L. L.) Operative measures with deciduous teeth. Pacific Stomatol. Gaz., San Fran., 1896, iv, 113-119.—**Dzierzawski** (B.) [Shortening of external pterygoid muscle from disease of teeth.] Kron. lek., Warszawa, 1896, xvii, 185-188.—**Eucainum** hydrochloricum, ein neues locales Anästheticum. Therap. Monatsh., Berl., 1896, x, 330-332.—**Flickinger** (A.) Pulpless teeth, roots and their treatment. Dental Cosmos, Phila., 1896, xxxviii, 554-556.—**Flouquet.** Epithélioma du plancher de la bouche. J. d. sc. méd. de Lille, 1896, i, 581-583.—**Foster** (S. W.) Diseases of the oral cavity a potent factor in general disease. Dental Cosmos, Phila., 1896, xxxviii, 569-572.—**Friedland** (F.) Ueber drei Fälle von Hyperkeratosis lacunaris (Siebenmann) des Zungengrundes. Ztschr. f. Heilk., Berl., 1896, xvii, 275-282, 1 pl.—**Fronhöfer** (E.) Die Enstehung der Lippen-Kiefer-Gaumenspalte in Folge amniotischer Adhäsionen. Arch. f. klin. Chir., Berl., 1896, lii, 883-901, 1 pl.—**Gangolphe.** Fibro-chondrome du maxillaire supérieur. Lyon méd., 1896, lxxxii, 330.—**Gilbert** (S. E.) Loretin, the new antiseptic. Internat. Dent. J., Phila., 1896, xvii, 441-444.—**Goddard** (C. L.) Extraction as related to orthodontia. Pacific Stomatol. Gaz., San Fran., 1896, iv, 157-166.—**Guérard.** Abcès fistuleux d'origine dentaire simulant une dacryocystite. Odontologie, Par., 1896, 2. s., iii, 269.—**Hélot.** Cas de résection du maxillaire inférieur. Rev. odontol., Par., 1896, xxxvii, 269.—**Hersh** (W. H.) A water rheostat for cataphoresis. Ohio Dent. J., Toledo, 1896, xvi, 313-316.—**Hinman** (T. P.) A mechanical appliance for the replacement of the right superior maxilla, the face, and a portion of the nose. Dental Cosmos, Phila., 1896, xxxviii, 559-561.—**Hollingsworth** (M. W.) Interdental space guards. Dental Cosmos, Phila., 1896, xxxviii, 553-554.—**Holloway** (W. G.) Anaesthetics as employed for operations on the throat and nose. Med Mag., Lond., 1896, v, 598-619.—**Hopkins** (S. A.) Cocaine. Internat. Dent. J., Phila., 1896, xvii, 431-440. [Discussion], 467-472.—**Hugo** (L. C. F.) Approximal work; the important factor involved. Dental Cosmos, Phila., 1896, xxxviii, 595-600.—**Kirmisson.** Traitement opératoire du bec-de-lièvre compliqué. Bull. et mém. Soc. de chir. de Par., 1896, n. s., xxii, 243-245.—**Kummer** (E.) Les kystes salivaires de la muqueux labiale; nature et traitement. Rev. méd. de la Suisse Rom., Génève, 1896, xvi, 295-301.—**Lemichez.** Forme molle et térébrante de cancer du maxillaire inférieur. Gaz. d. hôp. de Toulouse, 1896, x, 185.—**Lewis** (W. F.) Artistic and conservative treatment of the oral cavity and its organs. Pacific Stomatol. Gaz., San Fran., 1896, iv, 253-255.—**Magill** (William E.) [1825-96.] (Obituary.) Dental Cosmos, Phila., 1896, xxxviii, 613.—**Mahé.** Note sur l'airol, succédané de l'iodoforme, et sur son emploi en thérapeutique dentaire. Odontologie, Par., 1896, 2. s., iii, 338-344. [Discussion], 353-356.—**Mancini** (F.) Un caso di faringo-stomatite fungosa. Raccoglitore med., Forlì, 1896, 5. s., xxi, 317-322.—**Mariani** (W.) Nota clinica acerca de el lupus de la boca y de la faringe. Arch. lat. de rinol., laringol. [etc.], Barcel., 1896, vii, 121-125.—**Martin** (E. D.) A case of sarcoma of the superior maxilla with complete relief of deformity by artificial apparatus. N. Orl. M. & S. J., 1896-7, xlix, 25.—**Métral** (E.) Note sur l'emploi du carbonate de strontium dans les préparations dentifrices. Odontologie, Par., 1896, 2. s., iii, 297.—**Mills** (W. A.) Dermoid cysts *versus* migrated teeth. Dental Cosmos, Phila., 1896, xxxviii, 586-592.—**Mingazzini** (G.) Osservazioni cliniche ed anatomiche sull' emiatrofia della lingua. Arch. ital. di otol. [etc.], Torino, 1896, iv, 74; 182.—**Murrell** (W.) Preliminary report on the presence of arsenic in cigarettes. Brit. M. J., Lond., 1896, ii, 96.—**Péchin** (A.) Contribution à l'étude des affections oculaires et des sinusites de la face d'origine dentaire. Rec. d'opht., Par., 1896, 3. s., xviii, 257-270.—**Perry** (S. G.) Mistakes. Dental Cosmos, Phila., 1896, xxxviii, 537-551.—**Phillips** (W. C.) The principles and applications of cataphoresis. Internat. Dent. J., Phila., 1896, xvii, 418-431.—**Piéchaud.** Déviations congénitales de la voûte et du voile du palais. Mém. et bull. Soc. de méd. et chir. de Bordeaux (1895), 1896, 45.—**Piergili** (S. B.) Della frequenza delle malattie dei denti, e loro complicanze, nei bambini di Roma, e della necessità di una cura razionale. Boll. d. Soc. Lancisiana d. osp. di Roma (1895), 1896, xv, fasc. i, 50-57.—**Poncet.** Sarcome actinomycosique du maxillaire inférieur (actinomycome néoplasique). Lyon méd., 1896, lxxxii, 311-315.—**Portela** (J.) Un caso de parálisis faringolaríngea por lésion del espinal. Arch. lat. de rinol., laringol. [etc.], Barcel., 1896, vii, 155-158.—**Pritchett** (T. W.) To what extent is the washing of amalgam masses an important feature in the production of a good filling? Dental Reg., Chicago, 1896, x, 468-471.—**Prothero** (J. H.) Porcelain artificial dentures. Dental Rev., Chicago, 1896, x, 461-468.—**Robin** (A.) & **Leredde.** Des varices lymphatiques de la langue. Arch. de méd. expér. et d'anat. path., Par., 1896, viii, 459-467.—**Rollins** (W.) A Roentgen ray converter for internal use. Internat. Dent. J., 1896, xvii, 445.—**Roy.** Les caustiques en art dentaire. Odontologie, Par., 1896, 2. s., iii, 344-348.—**Sauvez** (E.) De l'or de Trey. *Ibid:* 321-338.—**Scafi** (E.) Resezione del condilo per serramento delle mascelle. Bull d. Soc. Lancisiana d. osp. di Roma (1895), 1896, xv, fasc. i, 87-90.—**Schamberg** (J. F.) Severe stomatitis following the administration of potassium iodid. Med. & Surg. Reporter, Phila., 1896, lxxv, 37-39.—**Schmitt** (A.) Operationen unter Cocainanæsthesie. München. med. Wchnschr., 1896, xliii, 566.—**Shearer** (T. L.) Electricity in diseases of the pharynx. J. Electrother., N. Y., 1896, xiv, 161-170.—**Sheild** (A. M.) A case of aneurism by anastomosis involving the vessels of the hard palate. Brit. J. Dent. Sc., Lond., 1896, xxxix, 537-545. [Discussion], 568.—**Soffiantini** (G.) Anatomia della glandola sottomascellare in relazione alle applicazioni chirurgiche. Atti d. Ass. Med. lomb., Milano, 1896, 8-14.—**Souchon** (E.) Uninterrupted anæsthesia in operations upon the face and mouth. Tr. South. Surg. & Gynec. Ass. 1895, Phila., 1896, viii, 256-264.—**Sous.** Kératite diffuse et dentition. Mém et bull. Soc. de méd. et chir. de Bordeaux (1895), 1896, 56-68.—**Stembo** (L.) Ueber die epidemische Stomatitis die im Sommer 1895 in Wilna geherrscht hat. St. Petersb. med. Wchnschr., 1896, n. F., xiii, 204-207.—**Stephens** (J. W. W.) & **Smith** (R. F. W.) Vibrio tonsillaris (Klein), Beschreibung eines aus der Mundhöhle isolierten Vibrios. Centralbl. f. Bakteriol. [etc.], 1. Abt., Jena, 1896, xix, 929-932, 1 pl.—**Sticker** (G.) Mundverdauung und Magenverdauung. München. med. Wchnschr., 1896, xliii, 592-594. ——— Mundverdauung und Milchsäurebildung. *Ibid:* 617. ——— Neue Beiträge zur Bedeutung der Mundverdauung; Schwefelwasserstoffentstehung durch Speichelwirkung. *Ibid:* 561-564.—**Stokes** (Sir W.) On a method of after treatment in cases of partial resection of the lower jaw. Practitioner, Lond., 1896, lvii, 32-38.—**Swain** (H. L.) Some remarks on acute disease of the lingual tonsil. N. York M. J., 1896, lxiv, 111-116.—**Targett.** Excision of temporo-maxillary joint for unilateral ankylosis. Abstr. Tr. Hunterian Soc. 1895-6, Lond., 1896, 108-110.—**Tomes** (C. S.) Further notes upon amalgams. Brit. J. Dent. Sc., Lond., 1896, xxxix, 529-536.—**Van Orden** (L.) Restoration of the contour and the occlusion of the teeth. Pacific Stomatol. Gaz., San Fran., 1896, iv, 105-113.—**Vignot** (J.) Anomalie de position de dent de sagesse avec exostose réunissant ses racines à la dent précédente. Rev. odontol., Par., 1896, xxxvii, 270.—**Vinci** (G.) Ueber Eucain, ein neues locales Anaestheticum. Berl. klin. Wchnschr., 1896, xxxiii, 605-608.—**Walker** (W. E.) Movements of the mandibular condyles and dental articulation. Dental Cosmos, Phila., 1896, xxxviii, 573-583.—**Winner** (W. G.) Unusual symptoms connected with teething. Med. & Surg. Reporter, Phila., 1896, lxxv, 41.—**Witthaus** (C.) Left-cutting burs. Dental Cosmos, Phila., 1896, xxxviii, 557-559.—**Zuccarelli** (A.) e G. Mauceri. Il 3° dente molare (cosidetto del senno) della mascella superiore studiato in 271 crane in rapporto con le anomalie craniche e con indice cefalico. Atti d. Soc. rom. di antrop., Roma, 1895-6, iii, 223-240.

◆

LIST OF UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING JULY, 1896.

July 7.—No. 563,664, to FRANK HURLBUT. Dental spittoon.
" *14.*—No. 563,995, to C. L. WOOLLEY. Electric generator.
" *28.*—No. 564,600, to W. S. ELLIOTT. Clasp for dental plates.
" " No. 564,877, to C. A. FLOWER. Method of preparing dentists' gold.
" " No. 564,919, to C. A. FLOWER. Method of preparing dentists' gold.
" " No. 25,843, to L. E. CUSTER. Design for electrical muffle casing.

THE

DENTAL COSMOS.

VOL. XXXVIII. PHILADELPHIA, OCTOBER, 1896. NO. 10.

ORIGINAL COMMUNICATIONS.

EXPERIMENTAL STUDY OF THE DIFFERENT MODES OF PROTECTION OF THE ORAL CAVITY AGAINST PATHOGENIC BACTERIA.

BY ARTHUR C. HUGENSCHMIDT, M.D. (PARIS), M.D., D.D.S. (UNIV. OF PA.).

(Researches made in Professor Metschnikoff's laboratory at the Pasteur Institute, Paris.)

IT is a recognized fact that operations performed in the oral cavity, without antiseptic precautions, are not ordinarily followed by serious infectious complications. After certain oral operations, the extraction of a tooth, for example, the soft parts of the injured territory often present the appearance of an ugly wound, pieces of gums remain detached, bony fragments due to alveolar fractures are bathed by the saliva. In fact, we find ourselves in the presence of a complicated comminuted fracture, and if we think of the great number of germs contained in the mouth, it is difficult to understand why such an exposed wound is not ordinarily the seat of severe local infections, and does not more often even bring on a general infection of the economy.

In this article I have tried to explain some of the causes of this relative immunity which the oral cavity presents against infection. Perhaps the few experiments here reported will contribute to enlighten a small part of this extensive and obscure problem of the defense of the mouth against pathogenic micro-organisms, and help to show the part played by the phenomenon of phagocytosis and the chemiotactile properties of the oral fluids, but it is to be clearly understood, especially because of the complexity of these phenomena, that there is no intention to here explain the entire mechanism of the immunity of the oral cavity.

I.—Bacteriology of the normal bucco-pharyngeal cavity.

The mouth, which is continuously in contact with the atmospheric air, the food and drinks presenting on one side the conditions of heat, moisture, and perfect alkalinization, is the receptacle of a considerable number of species of micro-organisms. As most of them are inoffensive saprophytes, essentially variable according to the individual, the ingesta and the moment at which the examination has been made, that class will not be herein considered. Others, on the contrary, have acclimated themselves and constitute the buccal flora, and will be briefly considered, after which those with which the surgeon has to do when he operates upon the oral cavity.

In the year 1881, Pasteur, Chamberland, and Roux isolated from the saliva of a child who died from hydrophobia, a micrococcus, which, when inoculated into the rabbit, brought on a fatal septicemia; this same microbe Pasteur found in the saliva of children who died from broncho-pneumonia, and in the normal saliva. Sternberg studied it, and soon Fränkel identified it with the diplococcus which he found in pneumonia, the pneumococcus. This pneumococcus the researches of Biondi, and especially those of Netter proved, is a frequent host of the mouth, and is found in twenty per cent. of healthy subjects. The researches of Netter have also shown how easily the virulence of this microbe varies according to the period of the year, the epidemic state, etc.

Much more important than the foregoing is the streptococcus, which Netter found in five per cent. of the cases in the normal mouth, but which F. Widal and Bezançon have found recently as a constant host of the mouth. This streptococcus exists as a pure saprophyte, and is absolutely devoid of virulence, as the inoculation of twenty samples has given in not one case lesions to the mouse or rabbit; but this streptococcus is quite ready to recuperate its virulence by the methods of bacterial associations, and then can give origin not only to erysipelas but to fatal septicemia.

After the streptococcus, but less frequently found, are the staphylococcus, the Bacterium coli commune, found in one-half of the cases by Grimbert and Choquet, the pneumobacillus of Friedlander, etc.

Roux and Yersin have also observed in the mouths of a certain number of healthy subjects a bacillus very much resembling the one of diphtheria, the pseudo-diphtheritic bacillus, which only differs from Lœffler's bacillus by the complete absence of virulence and the impossibility of recuperating it.

Miller, of Berlin, has described special microbes, which he considers, after a series of very interesting researches, to be the agents of dental caries. He encountered especially five species, and constantly in the normal mouth, the Leptothrix innominatus, the Bacillus buccalis maximus, the Jodococcus vaginatus, the Spirillum sputigenum, the Spirochæte dentium. Galippe and Vignal have isolated from eighteen teeth six species of microbes; four varieties have been constantly found, the fifth eight times and the sixth six times. In pyorrhea alveolaris, Miller has described, besides the ordinary microbes of suppuration, two new varieties: 1. The Micrococcus gingivæ pyogenes; 2. The Bacterium gingivæ pyogenes. Galippe and Vignal, in this same affection, have met a streptococcus, the Staphylococcus aureus and albus, Vignal's bacillus and two new varieties, *α* and *β*, isolated by Galippe. Rosenthal, who examined bacteriologically fourteen buccal cavities, has isolated twenty-eight different species of microbes, five varieties of which had never been described: 1. Sarcina viridis flavescens, resembling the tetragenus; 2. Micrococcus Reesii, a coccus ; 3. Micrococcus ochraceus, round or slightly oval cells ; 4. Diplococcus Hanserii, spheroidal or ellipsoidal cells without proper wall ; 5. Bacterium cerasinum, oval cells. These microbes can all be colored by the Gram method.

Freund examined sixteen mouths, as regards chromogenic or colored microbes ; he found eighteen varieties which, on gelatin, agar, or potato, gave a characteristic color, and among these eighteen varieties four which had never been described : 1. Micrococcus lactericeres, which takes or is colored by the Gram method ; 2. Micrococcus citreus granulatus, which does not take the Gram stain ; 3. Bacillus griscus flavus, takes the Gram stain ; 4. Bacillus viscosus odoraceus, takes the Gram stain.

Rosinsky, Thau, Leyden notice that the gonococcus, which is a passing host of the buccal cavity in the new-born, can bring on a characteristic inflammation of the mouth.

Schreier has examined bacteriologically twenty cases of dental periostitis, and has found almost constantly the diplococcus of pneumonia alone or associated with the Staphylococcus aureus et citreus, and the streptococcus. These results have not yet been controlled by other experimenters. Miller has never met the pneumococcus in the dental pulp, which is in the great majority of cases the passageway of the bacteria of the buccal cavity to the dental periosteum.

Babes believes he has found the bacillus of scurvy. He treated at the Military Hospital of Jassyer sixteen soldiers who had passed the winter in very poor hygienic conditions, and found in the mucous membrane of the gums a particular bacillus which, when injected into the rabbit, brings on extensive hemorrhages. He thinks that this bacillus is the analogue of one already found in the oral cavity which, under the influence of a lowering of the modes of defense of the organism, acquires a peculiar virulence.

We might finally mention a series of species not yet classified : the Leptothrix buccalis, the Vibrio rugula, the Bacterium termo, the Proteus vulgaris, the Spirillum, which, as M. Metschnikoff recently indicated, cannot be cultivated in any of our mediums of culture.

The mouth, although very favorable to the cultivation of microbes and possessing a great number of bacteria belonging to pathogenic species, is not very septic, and most of the micro-organisms which are encountered in the normal state are in the saprophytic state, and very attenuated. This is a general state of affairs, and a rapid study of the degree of virulence of germs on the surface of other mucous membranes shows us also that the microbes found are attenuated as regards their virulence, and reduced to saprophytes.

In the nasal cavity, although less numerously than in the mouth, are found a great variety of microbian species, pneumococcus, staphylococcus, streptococcus, pneumo-bacillus, etc., species which have lost their virulence, as has been shown by Wurtz and Lermoyez, attenuation which is attributed by them to the bactericidal action of the nasal mucus. On the surface of the conjunctiva are found many microbes, but we can consider the oculo-lachrymal apparatus as antiseptic, an aseptic state which Valude attributes to the bactericidal action of tears.

The study of the microbes of the vagina shows us the same state of affairs. According to the works of Winter, Widal, Doederlein, Stroganoff, etc., while they indicate to us the flora of that cavity, they show us microbian species without virulence. Pathogenic microbes introduced experimentally into the vagina by Stroganoff in the female rabbit, and by Menge in the human subject, disappear very rapidly. Here again numerous reasons have been given : the acid secretion ; the bactericidal properties of the secretions, and especially the mucus ; finally, the vital antagonism between the microbes and leucocytosis which takes place in the interior of that cavity.

Whatever be their seat, the germs which are profusely disseminated on the surface of the different mucous membranes possess a very feeble virulence, and always the same causes seem to act to bring on this attenuation, bactericidal properties of the fluids of the body, vital antagonism of bacterial species ; finally, the phenomenon of leucocytosis, which takes place in the interior as well as on the surface of the mucous membranes. These different causes of protection we shall find in the buccal cavity.

II.—Experiments as to the bactericidal properties of the saliva.

The first hypothesis which presents itself is : Are the microbes of the mouth, like those of most of our natural cavities, not attenuated by a bactericidal action of the glandular secretions, here the saliva ?

The first researches on the bactericidal action of the saliva are due to Sanarelli.

Sanarelli filters through a Chamberland filter saliva obtained from several individuals, and distributes it in a series of test-tubes, containing each from ten to fifteen cubic centimeters. This saliva, when filtered, presents itself as a transparent liquid, neutral or slightly alkaline.

In each of these tubes of saliva he introduces a loop of platinum wire containing a culture of a pathogenic micro-organism, and places it in an oven of the temperature of 37° C.

He then takes, at different periods, a loop of this liquid to cultivate on Esmarch culture plates, then studies the microbes which develop on it.

His conclusions are : 1. The human saliva must be considered as an entirely unfavorable ground for the development of certain pathogenic micro-organisms, such as the staphylococci, the streptococcus, the tetragenus, the Eberth bacillus, and the cholera spirillum.

2. If the number of micro-organisms is not large, after a long period of resistance they finally disappear.

3. Certain varieties continue to develop, the pneumococcus for example ; but this microbe, if its vitality is preserved, is modified in its form and its virulence is greatly attenuated.

Miller objects to Sanarelli that it is not astonishing if the filtered saliva is an unfavorable medium of culture for micro-organisms, as it contains only 0.15 per 100 of organic matter, while the non-filtered saliva, as it exists in the oral cavity, contains a very great quantity of nutritive matter,—*e.g.*, epithelial débris, mucus, exudates, etc. As to the attenuation of the virulence of the pneumococcus, it does not prove, according to Miller, the action of the saliva, for this microbe is so delicate that in any ordinary artificial medium it would lose its virulence, as well as in filtered saliva.

Miller, moreover, does not believe in the bactericidal properties of saliva, and thinks that the relative immunity of the oral cavity is due to a special power of resistance of the gums.

That experimenter has even inoculated a series of one hundred and eleven white mice with variable quantities of non-sterilized saliva ; ten only resisted the inoculation, all the others died from different infections. On the other hand, Galippe has found microbes constantly in the excretory ducts of salivary glands. All these facts are not much in favor of a bactericidal action of the saliva.

To test this bactericidal power of the human saliva I have undertaken a series of experiments, the principal ones of which are here reported.

The saliva is collected on rising in the morning, and distributed in sterilized test-tubes. This saliva is divided into two parts ; one is filtered with the Chamberland filter, while the other is simply filtered through ordinary filter-paper.

Whatever be the mode of filtration of the saliva, we have found by our experiments that the bactericidal property is the same ; consequently, we finally only employed the saliva filtered with the Chamberland filter, the only process by which the filtered liquid is rendered absolutely free from germs. The saliva is then distributed in a series of small test-tubes, each containing two cubic centimeters. Some of the small tubes are then contaminated with a platinum loop of a culture of Staphylococcus aureus. The tube is carefully shaken, and we then immediately take a loop full of this contaminated saliva and dilute it in a liquid gelatin tube, which is poured into a Petri box.

With other tubes of saliva we do the same operation, but, instead of taking a platinum loop of the contaminated saliva *immediately* after the contamination of the saliva with the staphylococcus, we take it one-half hour, one hour, and, finally, twenty-four hours later respectively, leaving the contaminated tubes in the mean time in the incubator at 37° C.

Following are the results obtained :

Experiment I.

Staphylococcus aureus (saliva filtered through the Chamberland filter) platinum loop.

Number of colonies on each plate of gelatin.

Immediately.	½ hour after.	1 hour after.	24 hours after.	48 hours after.
Not numerous.	Not numerous.	Not numerous.	Not numerous.	Not numerous.
II. *Torula* (saliva filtered with Chamberland filter).				
254	48	93	318	349
III. *Staphylococcus aureus* (saliva filtered through filter-paper).				
Not numerous.	Not numerous.	Not numerous.	Not numerous.	Not numerous.

IV.

Torula (saliva through filter-paper).

335	69	123	460	473

A second series of experiments having, as already stated, shown no difference of action between the saliva filtered through the filter-paper and the one through Chamberland's filter, we have only used in the following experiments Chamberland's method.

We know, since the experiments of Nuttal and Nissen, that the normal blood possesses bactericidal properties, or, more exactly, that a number of germs placed in that medium disappear without developing themselves. This bactericidal property, like the toxic or vaccinal properties of certain toxins, is extremely frail, and does not resist heating to 55° C. It then became interesting to verify for the saliva the comparative action of the non-heated saliva with the heated one, and to observe if the latter had kept its bactericidal properties.

Experiments concerning the comparative action between the non-heated saliva and the one heated to 60° C. for one hour:

V.

Torula (non-heated saliva).

Number of colonies on each plate of gelatin.

Immediately.	¾ hour later.	3 hours later.	10 hours.
5015	2845	3640	7080

VI.

Torula (saliva heated to 60°).

5566	1452	1540	2838

VII.

Sarcina (non-heated saliva).

Immediately.	½ hour.	1 hour.	24 hours.
90	216	380	1410

VIII.

Sarcina (saliva heated to 60°).

220	240	560	4780

Several experiments made with the sarcina seem to indicate no action whatever with the heated or non-heated saliva.

In the following experiments, instead of introducing into the saliva tubes a platinum loop of microbes, we have only introduced the quantity which would adhere to a platinum point, which permits us to study more carefully the supposed action of the saliva. In this manner less bacteria are introduced into the saliva, which renders the enumeration of the colonies much easier.

IX.

Torula (heated saliva).

Immediately.	½ hour.	1 hour.	24 hours.
274	224	210	265

X.

Torula (non-heated).

378	264	276	425

XI.

Torula (heated saliva).

16	20	35	118

XII.

Torula (non-heated).

25	26	110	848

One will note that while for the sarcina there exists no apparent action, for the torula there certainly exists a relative action; but this action, strangely, is more powerful with the heated saliva.

XIII.

Streptococcus (non-heated saliva).

Immediately.	½ hour.	1 hour.	8 hours.
250	276	312	3778

XIV.

Streptococcus (saliva heated).

145	198	179	2608

As a platinum point of Staphylococcus aureus gave us a liquefied culture in twenty-four hours, a point of staphylococcus is diluted in one cubic centimeter of a physiological solution of chlorid of sodium (artificial serum).

XV.

Staphylococcus (non-heated).

Immediately.	½ hour.	1 hour.	4 hours.
13	5	7	25

XVI.

Staphylococcus (heated saliva).

115	63	21	188

XVII.

Streptococcus (non-heated).

Immediately.	½ hour.	1 hour.	8 hours.
53	71	58	3120

XVIII.

Streptococcus (heated saliva).

1647	3400	4635	19920

XIX.

Staphylococcus (non-heated saliva).

Immediately.	½ hour.	1 hour.	Experiment forgotten.
6	6	5	—

XX.

Staphylococcus (heated saliva).

67	7	5	—

XXI.

Staphylococcus (non-heated saliva).

Immediately.	½ hour.	1 hour.	8 hours.
100	160	264	liquefied.

XXII.

Staphylococcus (heated saliva).

5185	5220	3105	6160

XXIII.

Staphylococcus (heated saliva).

59	36	88	220

XXIV.

Streptococcus (non-heated saliva).
(Two experiments with each.)

18	23	no culture	340
28	37	no culture	360

(gelatin probably too much heated.)

XXV.

Streptococcus (heated saliva).
(Two cultures.)

32	61	28	520
27	41	38	480

XXVI.

Staphylococcus (non-heated).
(Two cultures.)

27	30	36	510
32	27	40	550

XXVII.

Staphylococcus (heated saliva).

22	25	31	200
22	21	15	320

XXVIII.

Streptococcus (non-heated).

10	8	17	387

XXIX.

Streptococcus (heated saliva).

19	15	26	405

XXX.

Cholera from Massaouah (culture of 18 hours, non-heated).

Immediate.	½ hour.	1 hour.	7 hours.	24 hours.
220	256	248	11340	32627

XXXI.

Cholera from Massaouah (heated saliva).

108	280	496	10800	60939

XXXII.

Cholera from Massaouah (non-heated).

208	276	620	12960	36783

XXXIII.

Cholera from Massaouah (heated saliva).

344	392	644	18900	89487

XXXIV.

Cholera from Constantinople (non-heated).

Immediate.	½ hour.	1 hour.	7 hours.
140	240	440	2160

XXXV.

Cholera from Constantinople (heated saliva).

100	380	410	3600

XXXVI.

Cholera from Constantinople (non-heated).

140	388	540	210

XXXVII.

Cholera from Constantinople (heated saliva).

128	464	644	No culture.

In conclusion, on the torula, slight action of the non-heated saliva, but decided action of the saliva heated to 60° C.

On the sarcina no action. This bacterium develops in the heated saliva as well as in the non-heated.

The development of the streptococcus is influenced neither by the heated nor by the non-heated salivary liquid ; it is then not surprising that MM. Widal and Bezançon have found this bacterium constantly in the mouth.

On the Staphylococcus aureus the action is certainly greater than on the preceding micro-organism, and the heated saliva here again is more bactericidal than the non-heated one.

For the cholera there is absolutely no action ; the choleraic vibrio develops very rapidly in the salivary liquids. If there exists a difference of action it is due to the origin of the bacteria ; as we see it in the above experiments after seven hours of culture in the saliva, the choleraic vibrio from Massaouah develops much more rapidly than the one brought from Constantinople.

As is readily seen, the bactericidal action of the saliva appears to be *very problematical.* We have never been able to observe it in an evident manner on any of the microbes except the torula and Staphylococcus aureus. In numerous cases the microbes introduced in the saliva develop rapidly, so that their number after a very short time is much more considerable. Sometimes one observes in the beginning a certain slowness in the growth, or even one observes the destruction of the microbes introduced, but we must not forget that the very fact of transporting certain microbes from one medium to another is enough to partially destroy them; the development is interfered with on account of osmotic phenomena.

The experiments of Hafkine have shown that the infusions die rapidly if they are carried from one quality of water into another slightly variable in its chemical composition. The same author has shown that the bacillus of typhoid fever when accustomed to a medium not ordinarily favorable to its development grows with very great difficulty when brought back to a medium much more favorable to the species, *e.g.* to peptonized broth.

If in our experiments there is seen a certain bactericidal action, it is found not only in connection with the non-heated saliva, but also in connection with the saliva heated to 60°, which liquid is devoid of the bactericidal principles analogous to the one of blood-serum. We may even go further. We have found for the torula and staphylococcus that the saliva heated to 60° has a bactericidal property superior to the non-heated one. There is then no possibility of establishing a comparison between the supposed bactericidal power of the saliva and that of the blood-serum.

A close study of immunity has shown already that the bactericidal properties of the serum cannot explain the resistance of animals against the introduction of virus. We are then forced and authorized to conclude that the immunity of the oral parietes against infection is not due to a germicidal property of the saliva.

Mechanical Action of the Saliva.—If the saliva has not, through its bactericidal properties, the importance which some authors have attached to it, its function in the protection of the buccal cavity is considerable.

The secretion of the parotid and that of the other salivary glands has, in fact, an important use; it acts by diluting the bacteria, glueing them together and rejecting them from the pharyngeal cavity into the stomach, where they are destroyed by the gastric juice.

In all diseases where the salivary secretion diminishes, in cachectics, in infectious states, the mouth becomes dry, the lips also, and the bucco-pharyngeal cavity, ordinarily so well protected, becomes the entrance door, the most important one, perhaps, for secondary infections.

The saliva, as has been pointed out by Mendel, Joseph, Frey, and Sauvez, plays another important part; it dilutes the alimentary particles, prevents their stagnation in the oral cavity, and therefore their fermentation; it prevents also fermentation by its alkaline reaction.

Action of the Buccal Mucus.—It would also be interesting to study in the oral cavity the part played by the mucus secreted by the innumerable microscopic glandules of the mucous membrane. This mucus must play an important part when the salivary secretion is suspended. One observes, in fact, if one of the salivary ducts be kept closed, a hypersecretion of the mucous glands, especially of the palatal glands. If the palate has been well dried beforehand, one can see after a few seconds a great quantity of small drops of mucus, which soon unite. This secretion is especially active during the night, to replace the secretion of the salivary glands which is then suspended. In a great number of subjects, when the secretion of the saliva is suspended during the night the oral mucus has an acid reaction. This acid action is especially marked in arthritics, rheumatic, gouty patients, as was indicated long ago by James Truman, in those patients in whom one finds erosion of the teeth.

We are convinced that this mucus plays an important part, and that it is even bactericidal, but, to our great regret, we have not had time to carry on those experiments, and can only reason by analogy.

Let us remember the bactericidal part attributed to the mucus by Wurtz and Lermoyez. After three hours' contact with the nasal mucus at thirty-eight degrees, the spores of the Bacillus anthracis are killed, while the Staphylococcus aureus, the streptococcus, and the coli-bacillus are greatly attenuated.

A similar action has been attributed by Stroganoff to the mucus secreted normally by the cervix uteri, which mucus, when normal, destroys or attenuates the germs of the vagina and prevents them from penetrating into the uterine os.

Finally, as Widal remarked it for the bronchi, "The innumerable glands which exist on the surface of the respiratory mucous membrane secrete constantly a mucus which glues the corpuscles arrested by the bronchial parietes. This mucus has a bactericidal action toward these microbes, and kills them like an antiseptic."

There exists then on the surface of the mucous membrane a permanent liquid exudation analogous in constitution to the blood-plasma, and which certainly possesses some of the bactericidal properties of the serum.

All these bactericidal actions perhaps play a rôle in the attenuation of the virulence of the germs of the oral cavity, but are not sufficient to explain the relative natural immunity which it presents against bacterial infections.

Action of the Potassium Sulfocyanid.—We know that the real presence of this salt in the saliva has been doubted by several experimenters, among whom Berzelius, Lehman, Claude Bernard, the latter even attributing its presence to dental caries. Longet and Schiff, however, indicate it as a constant element of the human saliva in proportions varying from 0.10 to 0.20 to 1000.

Longet found it constantly in the saliva of the submaxillary gland as well as in that of the parotid and sublingual, in variable proportions according to the concentration of the salivary liquid, but there is no relation between the pathological state of the teeth and the presence of this salt. One might ask the question, and this hypothesis has even been formulated, whether the potassium sulfocyanid did not play the rôle of a salivary antiseptic agent. To verify this hypothesis we have made the following series of experiments.

Personally, we do not believe in the actual presence of the sulfocyanid, notwithstanding the chemical test; we think that this constant reaction given by the perchlorid of iron indicates the presence of another body, an organic compound perhaps, not yet found, which gives a chemical reaction analogous to the sulfocyanid, but which is not that salt.

We have employed in our experiments solutions of 0.06 to 1000, 0.10 to 1000, and 0.20 to 1000 of potassium sulfocyanid in distilled water on the one hand, and in physiological serum on the other, but we have not observed any bactericidal action. Here is one of the experiments made with a 0.10 to 1000 solution.

We have taken a platinum point of a staphylococcus culture which has been placed in a small tube containing two cubic centimeters of the above sulfocyanid solution, then we immediately took a point of this solution to contaminate a tube of liquid gelatin, from which a Petri gelatin plate was made. The liquid was then placed in the oven at 37° C. Half an hour later another culture was made, as well as one hour after, and twenty-four hours later. The same experiment was made with the bacillus of typhoid fever.

I.

Immediately.	½ hour.	1 hour.	24 hours.
Staphylococcus.			
600	420	462	1400
Typhoid fever bacillus.			
364	195	212	203

These experiments repeated with 0.06 per 1000 and 0.20 per 1000 gave the same negative results. The action of the potassium sulfocyanid in the saliva as a salivary antiseptic is most contestable, not to say absolutely nil, and plays no bactericidal part.

Action of Phagocytosis in the phenomenon of protection of the buccal mucous membrane against the invasion of bacteria.—If the bactericidal properties of the saliva remain very problematical, it is not so with the part played by phagocytosis in the protection of the organism in general and the oral cavity in particular.

We know in a general way that Metschnikoff attributes a phagocytic property to the mesodermic cells, and, in particular, to certain varieties of leucocytes. If the lymphocytes, small embryonal leucocytes, with a large nucleus and little protoplasm, are not phagocytic, the other two principal varieties of blood leucocytes, the mononuclear leucocytes (large leucocytes with abundance of non-granulated protoplasm, one single rounded or oval nucleus, vesicular, fixing slightly the basic coloring matter), and especially the polynuclear leucocytes (leucocytes with multiple nuclei, fixing strongly the basic coloring matter with a protoplasm sprinkled with neutrophile granulations), are endowed to the highest degree with phagocytic properties. These two varieties of cells possess amœboid properties, and it is especially the latter, the polynuclear cells, which are essentially migrating cells, which in the pathological as well as in the physiological state come out of the vessels to pass into the lymphatic circulation and between the membranes of the surface, epithelium and mucous membranes.

The other variety of leucocytes, the eosinophile leucocytes, or those with acid granulations, have much less important phagocytic properties, yet let us remember that very recently the phagocytic part of the eosinophile leucocytes has been demonstrated.

The leucocytes are not the only phagocytic cells; we know the part attributed by Metschnikoff and well demonstrated for the experimental carbuncle infection by Werigo to the endothelial cells of the viscera, to the endothelial cells of the lung, and, above all, to the endothelial cells of liver and spleen capillaries.

As to the fixed cells of the connective tissue and the cells with basic granulations, their phagocytic part is questionable.

The epithelial cells which cover the cutaneous or mucous surfaces do not possess phagocytic properties, and the microbes which are often stuck on their surface can penetrate into them, but are not by them englobed as by the leucocytes.

The different varieties of contractile and phagocytic leucocytes, the polynuclear leucocytes especially, are found in great quantity in the derm situated under the mucous membrane ; in the mouth, in particular, their number is particularly important, and there almost exists, so to say, behind the epithelial membrane, a real lymphatic lake. It is especially on a level with the posterior pharynx that this lymphatic formation is of considerable importance, besides the two tonsils, which are nothing else than two lymphatic centers in intimate connection with the buccal mucous membrane, and which, by its lacunæ and crypts, still more multiplies the relations between the bucco-pharyngeal cavity and the lymphatic organs. There exists in the whole cavity of the posterior pharynx an uninterrupted layer of lymphatic follicles, some isolated and irregularly disseminated, occupying the posterior pharyngeal wall ; the others form vertical lines, doubling on each side the posterior pillar of the soft palate ; the others are spread on the dorsal surface of the tongue, constituting a sort of layer extending between the lingual V and the circumvallate papillæ, the epiglottis and the tonsils. Let us mention, in addition, the follicular masses known as the palatal tonsils or Luschka's pharyngeal tonsil.

Numerous leucocytes coming from these lymphatic centers constantly arrive at the surface of the mucous membrane, which phenomenon has been well demonstrated by Stoer. This exit is demonstrated by the presence in the secretions and by a microscopical examination of the mucous membrane, where one can see the passage of the migrating cells between the epithelial cells.

Leucocytosis, that is, the necessary act of phagocytosis, is then a physiological act which is easily observable in the bucco-pharyngeal cavity. We know, on the other hand, that according to circumstances this leucocytosis is actuated or prevented, for there is an interesting fact not well known, which is that the leucocytes possess a peculiar sensibility which permits them to direct themselves to a certain point ; like all sensibilities, theirs can be decomposed, and the most important fact in the points of view which occupy us is their chemiotactile sensibility,—that is, the property of being attracted by certain substances and rejected by others.

Experiments concerning the positive chemiotactile properties of the non-filtered human saliva.

The attractive and repulsive action of certain agents was first studied on vegetables of simple organization by Pfieffer, and has been extended to the leucocytes especially by Massart and Bordet, who have clearly demonstrated the chemiotactile properties of the white blood-corpuscles. By introducing into the peritoneal cavity of an animal small capillary tubes containing the substance, the influence of which is to be determined, these authors observed that in case of positive chemiotaxy the leucocytes penetrated in great quantity in these tubes. It was found that a great number of microbes possessed these positive chemiotactile properties.

The saliva being a medium of culture where a considerable number of microbes are found, one can think that these organisms secrete certain substances capable of having a positive chemiotactile property on the leucocytes, and the fact is probable on account of the saprophytic state in which these microbes of the mouth are found, so that the toxins and leucocytes become accustomed one toward the other. Massart has already shown how by a sort of preliminary education a living cell can be attracted by a substance which previously presented negative chemiotactile properties.

Extending to the mouth these general facts, one can formulate the hypothesis that the saliva in the normal state exerts a continuous attraction for the leucocytes which influences the accumulation of leucocytes or phagocytes, so favoring the protective reaction, and that this action, taking place on the surface of a wound in case of traumatism, permits an abundant reunion of leucocytes, which englobe the bacteria introduced in the wound with the saliva.

To study whether the saliva really possesses attractive properties toward the leucocytes, we have used the same technique employed by Massart and Bordet to determine the chemiotactile properties of the white blood-corpuscles.

This process consists in introducing in small capillary tubes the substance which is supposed to possess or not attractive properties. These tubes are closed at one extremity. So prepared, they are united several together with a thread and placed in the peritoneal cavity of a guinea-pig, where they are left several hours ; they are then taken out again, and, if the substance studied presents attractive properties, one can observe that a certain number of leucocytes of peritoneal origin have penetrated in the tube, forming a compact plug, obstructing the lumen of the capillary tube.

The experiment which we have made is the following : Human saliva ejected in the morning is left for some time in an experiment glass. The upper part of the liquid, left a few hours at the ordinary temperature, becomes clearer, is taken and introduced in small quantities in capillary tubes, which are each one closed at one extremity. They are then introduced into the peritoneal cavity of a guinea-pig, where they are left eight hours, after which they are taken out. One finds then that the leucocytes have formed a dense plug two millimeters long. The same experiment repeated on mice gave us the same results.

Moreover, in another series of experiments made with saliva which was kept for twenty-four hours in the oven at 37° C., and in which the number of microbes had greatly increased, we found that the plug formed by the leucocytes in the capillary tubes was visibly larger. The value of the attraction exerted by the leucocytes is then in relation with the intensity of the culture, and consequently with the quantity of microbian products present in the liquid.

From this one can deduce that when there exists in the interior of an alveolus after a dental extraction, or in any other point of the buccal parietes, a cavity where the saliva can remain and become the medium of an abundant culture, this saliva presents chemiotactile properties in relation with the quantity of microbes which have developed in it. The leucocytes of the neighborhood will be energetically attracted toward the diseased point, and will in a very marked way accomplish their protective action.

But in this experiment I have used a saliva from a species different from the one from which we have studied the white blood-corpuscles from a chemiotactile point of view. This circumstance could be considered as falsifying the result of the experiment. We know that the human saliva attracts in a very positive manner the leucocytes of guinea-pigs and mice. It would be interesting to know if the saliva of one animal attracts the leucocytes of the same animal. We have made on the guinea-pig an experiment which responds to this in the affirmative.

With a pointed glass tube saliva is obtained from the mouth of a guinea-pig, and is examined microscopically. One observes that the liquid is packed with microbes of all sorts, among which are seen very thin and straight bacilli which are colored by the Gram stain, a streptococcus, large diplococci which are also colored by the Gram stain, a long and fine bacillus which is not colored by the Gram stain, a cocco-bacillus presenting the same particularity and resembling very much Friedlander's pneumococcus. Capillary tubes are filled with this saliva and introduced with all due antiseptic precautions in the peritoneal cavity of the animal from which the saliva has been obtained. Ten hours later the tubes are taken out, and one observes that the leucocytes have well penetrated into the capillary tubes.

The leucocytes, which are placed on a microscopic slide and colored, appear under the form of polynuclear cells. These leucocytes are, so far as one could see, the most active phagocytes, and certain of these cells contained in their protoplasm microbes which had been in the saliva.

In all these experiments we have prepared not only capillary tubes containing the saliva to be examined, but also other tubes filled with a substance surely attracting the leucocytes (such as broth contaminated by the Staphylococcus aureus), and others containing substances which possess no attractive influence on them, such as an aqueous solution of NaCl (0.60 to 100), which are introduced into the abdominal cavity of guinea-pigs. These tubes are introduced as control experiments.

From what precedes, we can deduce that when a wound is produced in the mouth, artificially or accidentally, the saliva bathing the lesion exerts on the leucocytes an attractive influence the effects of which are the more marked if this influence is exerted in a constant and prolonged form.

There remains to determine experimentally whether the phagocytes of an animal—a guinea-pig, for example—are capable of englobing and digesting the microbes which are cultivated in the salivary secretion. In this point of view, one can easily study the leucocytes of guinea-pigs by taking from that animal a small quantity of peritoneal exudate, of which one has previously increased the number of phagocytes by injecting into the peritoneal cavity, twenty-four hours in advance, some peptonized broth. If one mixes some of that exudate with the saliva, and transferring the drop so obtained in the incubator at 35° C., preventing the evaporation by using the moist chamber, the phagocytes can accomplish their function and englobe the microbes brought into contact with them.

Experiments.—*a* (Human Saliva).—Leucocytes from guinea-pigs are mixed with human saliva, which had previously been left quiet for several hours to allow alimentary particles or other cellular elements to deposit at the bottom of the glass. The preparation is then carried to the oven for one hour; the liquid is then placed on slides and fixed, then colored by Ehrlich's process, which consists in the successive use of eosin and methyl blue.

Eosin is used in hydro-alcoholic solution,

Eosin, B, aqueous kind, 0.50;
Alcohol 60°, 100 grammes.

and the methyl blue in aqueous solution,

Methyl blue, 3 grammes;
Distilled water, 100 grammes.

The preparation is brought in contact with each of the coloring matters for four to five minutes. On microscopical examination of the slides, one observes that the leucocytes have taken up the microbes with great avidity also, that among the variable microbian species found in the saliva there is not one which has not some of its representatives amidst the protoplasm of the leucocytes.

b (Guinea-Pig Saliva).—A small quantity of saliva from this animal is collected and mixed with leucocytes taken from the peritoneal cavity of the same animal. These preparations are placed in the oven, where they are left for two hours, after which they are colored, and one observes that the englobement of the microbes is as complete as possible.

Two facts are therefore proven. The saliva attracts the leucocytes, and favors, consequently, when a wound is produced in the mouth, the rapid arrival of these protective elements. The leucocytes are capable of absorbing with the greatest energy the different microbes present in the oral cavity and of destroying them.

There now remains to observe the activity of such englobement in a wound produced artificially in the mouth.

A trace of saliva is taken from a guinea-pig, from which preparations are made and colored, some with the methyl blue and others with the Gram. This being done, a wound is made on the gum in the median line of the inferior maxilla, part of the mucous membrane is removed, and the wound and bone somewhat scraped. Twenty hours later one finds that the wound presents a white coating constituted by leucocytes, almost all polynuclear, some mononuclear; these leucocytes are smeared on a microscopic slide and colored.

In the protoplasm of these cells one easily finds the presence of a variety of microbes, similar in their form, character of coloration, to those seen in the preparation of saliva. Quite a considerable number of englobed microbes are less energetically colored than those which remained free in the surrounding liquid ; this is a proof of their phagocytic destruction. Some of them, contained in phagocytic protoplasm, absorb eosin instead of being colored by their natural coloring matter, the methyl blue.

These color reactions are of the greatest interest, and must arrest us one moment.

The loss of the coloring power of bacteria is, as was well demonstrated by Metschnikoff, a good indication of their degeneration ; it is a well-known fact to-day. It is not the same with the properties which possess the degenerated bacteria of fixing not only the anilin basic colors, as in the normal state, but also the acid colors, eosin in particular, so that the cells which contain acidophile granulations very much resemble real eosinophile leucocytes, and we are justified in asking ourselves whether a great number of eosinophile cells are not phagocytic leucocytes containing in their protoplasm degenerated bacteria.

Metschnikoff was the first one to see the englobed cholera vibrio to fix eosin ; Cantacuzene has observed the same fact with the Vibrio Metschnikovi ; Mesnil for the carbuncle bacteria ; finally, Jules Bordet has observed the same fact for a great number of microbes (cholera vibrio, Bacterium coli, typhoid fever bacillus, Friedlander's bacillus, diphtheric bacillus, the proteus, the streptococcus, etc.), and has shown that in cases in which the englobed microbes are cocci one is very much struck by the resemblance existing, after a certain time, between the microbes which have become eosinophile and the granulations of the same name.

The saliva in the last experiment contained no streptococcus chains. It is easy to introduce in the mouth a few drops of a virulent culture and to see if the englobement has taken place. To this end, a few drops of streptococci culture were introduced in the guinea-pig's mouth where a wound existed.

Four hours later, the surface of the wound was gently scraped and an exudate rich in leucocytes collected ; in some of these cells streptococcic chains, analogous to the ones found in the culture, were easily observable. The next day the wound was cicatrizing and closed without any further accident. The same facts of phagocytosis and destruction of the microbes existing in the mouth by the leucocytes are observed, if we introduce in the gum of the animal a foreign body, a splinter of wood for example. Soon, around the foreign body, pus appears, which is constituted of leucocytes, several of them containing bacteria, cocci, derived from the saliva. In the leucocytes the microbes are much less colorable, as they are partially degenerated ; out of the leucocytes they keep their normal aspect.

We are then justified in concluding that the resistance of the tissues constituting the buccal parietes toward the microbian agents, so abundant in the mouth, is due to the energy of phagocytosis, a general function of the organism.

On the chemiotactile property of the filtered saliva.—In the preceding experiments we have employed the saliva as we found it, in the buccal cavity, mixed with microbes and not filtered ; it is this saliva which is most interesting to us in a clinical point of view, as the filtered saliva is never present. Still it was open to the objection that this positive chemiotactile property was not due to the salivary liquid itself, but to the presence of bacteria in this liquid, and, in fact, this is what results from the following experiment :

Human saliva was collected in the morning in sterilized tubes. One hour later this saliva was filtered with the Chamberland filter. He then took a series of six capillary tubes in which was introduced filtered saliva. These tubes were closed at one extremity. Another series of six tubes containing physiological serum was made, and finally six tubes containing a cholera culture. These three bunches, separately attached, were placed in the peritoneal cavity of a guinea-pig and left ten hours. When removed, we observed that the tubes containing the cholera culture presented a dense plug of leucocytes, while in those containing the saliva only a very small number of leucocytes had penetrated, and so very few that it may be considered as neutral. In the tubes containing the physiological serum no trace of phagocytes existed.

Part played by the epithelial cells and the vital antagonism of microbes.—The phagocytic action is not the only one of the numerous causes of destruction of bacteria ; an additional mode of protection of the buccal cavity in general and gums in particular against the invasion of the pathogenic microbes is that general property possessed by stratified pavement epithelia to renew themselves continuously by their superficial layers. In the same way as on the skin, where the epithelial cells are in a state of permanent desquamation, in the bucco-pharyngeal cavity the epithelial cells are also constantly replaced. This desquamation is especially active during the act of mastication ; enormous quantities of cells are rejected, and one can say that at each meal the complete epithelial covering of the buccal cavity is renewed. As we said before, if the epithelial cells do not possess phagocytic properties, they are lined on their surface, filled between them, sometimes even penetrated by scattered bacteria which are dislodged and swept away by the saliva into the alimentary canal, where the stomach destroys them.

One could, as already indicated by Mendel Joseph, now that our knowledge on the reciprocal action of microbes has become more complete, explain that the attenuation of the virulence of a microbe which exists in very restricted quantity in the mouth may be due not to the saliva itself, but to the micro-organisms of all kinds which are present in that liquid. It is a fact that certain microbian species, special to the mouth, grow more vigorously than others in the saliva, and that their development can prevent the development of other frail microbes or diminish their vitality, and render their pathogenic faculties less active. The microbes interfere with one another, and this interference must bear especially on species which are not well adapted to the nutritive media where they are found.

The pneumococcus, for example, can be found in the saliva, but its development is never so luxurious as that of the bacteria which have for their ordinary medium of culture the saliva, and which have been for a long time adapted to that medium.

The ordinary saprophytes of the saliva are, then, those which in the antagonism between the species have the greatest chance of remaining victorious by restraining the development of the other microbes which are accidentally met with in the mouth. Metschnikoff has even demonstrated that there exist certain preventive microbes,—

that is, microbes the presence of which is particularly disagreeable to certain other microbian species.

This vital antagonism we observe everywhere as one of the principal agents of destruction of bacteria accidentally introduced into a certain medium. It is this fact which explains why certain pathogenic microbes, such as the bacillus of typhoid fever, the carbuncle bacillus, introduced in water, disappear rapidly, and which permits us to comprehend the spontaneous cleaning of the waters of rivers.

In the vaginal cavity, the experiments of Menge have shown this vital antagonism to play the most important part. The antagonism between the ordinary vaginal bacilli and the micro-organisms introduced artificially is one of the most important factors in the mechanism of auto-aseptization of the vagina. Very numerous at first, the microbes artificially introduced—pyocyanic bacillus, streptococcus, Staphylococcus aureus—soon disappear, so that, after a certain time, the vagina does not present a single one of the micro-organisms introduced.

One can conclude that the resistance of the tissues constituting the buccal parietes, by the microbian agents so numerous in the buccal cavity, is due to the energy of the phagocytosis as a general function, but favored here especially by the constancy of the attraction exerted on the leucocytes by the microbes and their products dissolved in the saliva. One must not forget, however, the attenuation of the virulence of bacteria by the mucus and transuded serum, the destruction of a great number of bacteria by the constant desquamation, and the diminution of the number of species by the vital antagonism.

The bucco-pharyngeal cavity is a medium which changes constantly in its constitution, and without doubt there exists the same analogy between the defense of the mouth against the microbian species as the defense against poisons. The least mutation is sufficient to change the conditions. Do we not know that the acidity of the saliva, such as we observe it on the day following too copious drinking,—drunkenness,—suffices to facilitate the absorption of lead by the buccal mucous membrane, and to facilitate lead-poisoning on alcoholic patients?

As stated at the beginning of this work, there has been no pretension to explain the whole complex process of the defense of the bucco-pharyngeal cavity against the invasion of pathogenic germs. I have only desired to ascertain whether experimentation would not permit me to elucidate some few among the many obscure points of this vast and complex problem of the immunity of the oral cavity.

PROFESSIONAL FEES.

BY SAFFORD G. PERRY, D.D.S., NEW YORK, N. Y.

(Read before the Dental Society of the State of New York, May 13, 1896.)

THE word fee seems to be of complex origin. It is an Anglo-Saxon word, and in one of its relations is derived from *feoh*, which means cattle. Originally cattle were used as money for purposes of exchange. This is shown in another way by the Latin *pecus*, which means cattle; hence our word pecuniary, which relates to money.

In early English the word fee came from *feh*, which also signified cattle. In the German ot early times the word *vieh* (pronounced like fee in English) stood for cattle in the same manner. In the German of to-day it has the same meaning, but has been broadened somewhat by being used as we use the term beasts.

Traced to another root it seems to be derived from *feu* or *feudom*, medieval Latin words relating to tenure of land, which was given as a reward for services rendered the Lord of the Manor, or the Crown. From these words came feudal; hence the feudal system, under which the lords owned the land, but gave the use of it as a reward for fealty to them in times of war. They gave much, or little, the amount being determined by their own will, and without consultation with those to whom it was given.

Under the old English law the term fee, as applied to land, implied tenure, or use only. Under our law it implies unrestricted ownership, as expressed by the term "held in fee." Under the feudal system the crown was entitled to the fealty of the lords, and the lords to the fealty of their vassals, or tenants.

The word fealty, in its general use, clearly indicates its origin to have been from the original word fee.

After the Norman conquest, and when England became more civilized, the word fee came into use as expressing reward for services rendered in other ways than in war, and by other means than by use of land.

Barristers and physicians and surgeons were rewarded for their services by fees, which in amounts were still given only in accordance with the pleasure of the giver. Professional men did not yet make out their bills. Nor could they have collected them if they had, for they had no standing in the courts.

In England it was not until 1849 that barristers were accorded rights in law, and were allowed legal standing in the courts. Before that time, unless a special contract had been made, no professional man could collect his fees by force of law. It has been, therefore, only during Victoria's reign that professional men have been accorded legal standing.

During medieval times the Church was the repository of learning. It has been well said that but for the monasteries, in which learning was preserved, much of the knowledge derived from the ancients would have been lost. There was not at that time much learning in the world outside of them.

Many of the lords and nobles holding high positions could not even write their names. They could only legalize their decrees by stamping them with their seals; hence the wearing of seal rings.

The monks generally were men of learning. They had some knowledge of science and medicine, and in addition to their religious ministrations they applied their knowledge for the benefit of the rich as well as for the poor. For this, as well as for their ecclesiastical functions, they received fees which were voluntarily given them. The church did not, and does not, allow a fee to be exacted. A minister who performs a marriage ceremony, or a funeral service, to-day is given a voluntary fee as in the early times.

The giving of fees can also be traced back to ancient Rome. In the practice of the law, when an advocate appeared for a client he did so for honor. If he was given a reward it was called an honorarium. It was not given as a present, but as a mark of honor. It was not given as payment, but as an expression of gratitude which could not be paid in money.

Long after this period in Rome, and still later in England, when reward by fees became more common, payment of them was made before they were earned. This was to eliminate all interest in the case beyond that of trying it on its merits. Any bargain made beforehand depending on the issue of the case was considered dishonorable. This, in the past, did much to keep the bar above reproach. A retaining fee is exacted and given to-day before the case is tried, but not for the same reason. It is required as an evidence of good faith on the part of the client, and to pay for the preliminary preparation of the case before trial, and also to secure the services of the lawyer against his employment by the other side. It is allowed for in the final settlement.

In this way the word fee has come down to us in the past, with its different meanings and applications, and as used to-day it has probably a wider range than ever before. It is not altogether a satisfactory word for the use of professional men for that reason. But it has grown into the language and probably will not be displaced. In some respects it has fallen to base uses, for men now not only fee their servants as a reward for service performed, but they fee their way through the world, hoping thereby to get better service, and to gain an advantage over the neighbor who does not resort to that practice. This selfish and pernicious habit has grown to enormous proportions in our modern life.

A generous fee given for an honest service is without reproach, but a fee given beforehand in order to secure a better service than is accorded to a neighbor becomes a bribe, and is degrading to the one who gives and the one who receives.

But we are not so much concerned with the word fee in its objectionable sense ; we are more interested in its higher and nobler use, and this will be found in its application to professional life.

In the early days, as before indicated, even professional men received only what was given them. They were not consulted, or, if they were, they had little to say in determining the amount of their fees. It was at a time in the world when might was right. Knowledge had not yet asserted itself. It was tolerated, but it was not supreme. If learning was honored in Rome, in the Middle Ages, it was not potent in England, for that country had not yet emerged from semi-barbarism.

To-day the conditions are all changed. Now knowledge is power. Right is mighty and will prevail. The advance of civilization has set up new standards, and we no longer look back for guidance in formulating our rules of action. We look about us in the vital present, or forward in the ideal future, for an answer to the question of what we shall do, and why and how we shall do it. In this way, and in this way only, shall we find the basis for the establishment of a just and comprehensive system of professional fees.

To-day the professional man himself is the most competent judge of the value of his own services, and to him is left by common consent the power to decide what the compensation shall be.

The lawyer no longer needs to look back to the time when he interpreted the law to suit his sovereign.

To-day he interprets it for him, and His Majesty is wise only as he heeds the interpretation.

The surgeon no longer looks back to the example of the barber, whose red and white pole on every street reminds of the time when it was an emblem of cupping, and leeching, and blood-letting.

Nor does the physician refer to the time when his ancestor, the medicine-man, with a beating of tom-toms, invoked the spirits of the air and practiced the art of witchcraft, to cure the patients who were only little less ignorant than himself.

To-day the question is, what does a man know and what can he do?

If he can demonstrate his knowledge and his skill, the purse-strings of the world are open to him, and he can take his reward without waiting to have it bestowed upon him.

And the world acknowledges the justice of this, because, in modern life, there is no power so great as that of knowledge.

All down the ages the current has been setting in this direction, augmenting and increasing as man's activities have widened and his subjugation of the forces of Nature has extended. The whole world to-day is watching, with bated breath, for the discovery that shall follow that of the Roentgen ray, and it is ready to pour its treasure into the lap of him who can add one more fact to the sum total of knowledge already tabulated.

The growth of what we will call the fee system has been a gradual evolution. It has undergone changes from time to time that have brought about readjustments in accordance with new conditions that have existed in the world until it has finally come to be generally acknowledged as a sort of code, unwritten it may be, yet resting securely upon the idea that a professional man is the best judge of the value of his own services, and containing the elastic quality that is essential to satisfy the demands of educated men. Knowledge makes men free. It gives them the freedom of authority. The world is being peopled with new kings. The man of science is a king who reigns supreme in a kingdom not subject to the disintegrating influences that are slowly, but surely, destined to sweep the old monarchies off the face of the earth. All down the ages kings have boasted that they ruled by divine right. It has been the cheekiest claim that man has ever made since he emerged from his tadpole existence. The German emperor, William the First, voiced this claim on all convenient occasions, and yet he was but a child in the hands of his physicians; and his son Frederick, with all Europe at his feet, in his fatal illness sought help only from men of science. And his haughty and imperious son, the present Kaiser, knows there is one man in all the world he must obey,—his doctor!

The professional man, at last, is the one who rules by divine right,—a right based upon his intelligence, which alone invests him with divine authority. It gives him the right to impose the conditions under which he will extend his services to his fellow-men.

There is no standard by which to gauge the value of his knowledge or his skill. It must be done in the supreme court of his own intelligence. It cannot be measured, or weighed, nor can it be estimated by hours or days. It is subject to no conditions. Therefore, there must be individual liberty in imposing fees. It does not follow from this that men may exact unjust fees. This individual liberty is the right only of those who possess knowledge in its largest sense,—knowledge which cultivates in them a sensitive conscience, enabling them to appreciate justice, and develops in them a tender heart, leading them to be helpful to their kind.

These qualities combined make the professional man a supreme judge in the highest sense, and one from which there can be no appeal. It does not affect the argument to contend that these conditions of mind and heart are not often found. If we are to search for a fundamental rule that shall be our unfailing guide, we can only find it in the highest qualities to which man has yet attained. It will be a rule that will not permit an unreasonable fee to be exacted by a man who has an exaggerated opinion of his own attainments and abilities, nor will it be one that will tolerate an inadequate one, imposed by a man who is lacking in self-respect, and whose tendency is to belittle himself and his profession. Nor will it for a moment tolerate the liberty of a man who takes advantage of his membership in a liberal profession to impose an unjust fee upon a confiding person who has no means of gauging him, except by the fact of his being a member of that liberal profession.

And the world to-day takes this view, and willingly sustains professional men in making their fees in accordance with their own ideas of what is fair and just. And this very fact imposes upon professional men a condition the most sacred of any in professional life. They must not only be competent to fulfill their duties to those who put themselves unreservedly in their hands, but they must be scrupulously careful not to abuse that confidence by securing unjust fees.

If one will stop for a moment to consider the full import of this, he will more fully appreciate the tremendous progress that has been made by the race since medieval times. Lecky, in his remarkable book on the History of European Morals, lays down the rule that morals are to be judged not by the outward pretensions of a nation, but by the manner in which morality is actually realized among its people. Judged by this standard, there is no more significant and hopeful fact in our modern life than the one that professional men are allowed, without question, to make their own fees. It indicates in one sense to what a degree morality is realized among people in their every-day life at the present time.

It implies a sense of honor that lifts professional life above the degrading and demoralizing influences that in our modern civilization go side by side with all that is best in human nature.

Here, then, I think we have found the secure foundation upon which the system of fees that shall be charged by professional men must be founded. The central fact to be considered is, How much have we benefited the person who has placed himself in our charge? There are other factors, but this is the one of greatest importance. The time spent in fitting one's self for the discharge of professional duties makes the second one.

Experience, which brings the ripened judgment, makes the third,—though this may be only an extension of the second,—and the time and effort given make the fourth. But the first is the one that leads all the rest.

In a world in which there is ignorance and weakness and disease, the first duty of a professional man is to eliminate those conditions, as far as possible, and the measure of his success will be, for the most part, the just measure of his reward. If it does not all come to him in money, it will come to him in consciousness of duty done, and that often may be worth more than money. In the net-work of human relations no man can live for himself alone, and no professional man can labor earnestly for his fellow-men without receiving much in the way of reward that will never appear on his day-book or ledger.

There is a humanizing quality in professional work that lifts it above the work of buying and selling, and above the task of controlling the forces of nature. To be of service to a human being is to perform a noble task, and one in which a man is worthy of his hire. The physician who can save a man's life, the surgeon who can repair his injuries, and the lawyer who can make him secure in the possession of his earnings, and the minister who can develop and direct his spiritual nature, have done a service that cannot be wholly paid for in money.

Feeling certain of the truth of the principle we have laid down as a foundation for the establishment of professional fees, we now come to the consideration, more particularly, of dental fees.

Assuming dentistry to be a branch of the healing art, it is readily seen that it must be subject to the same rules that govern the department of medicine and surgery. The educated dentist of to-day is a professional man in the fullest sense of the term. His education has been such that he can be considered in no other light. He is so recognized by the state, and laws for his protection have been passed, as has been done for physicians and surgeons. There is no part of his work which should not be considered from a strictly professional standpoint. The question of his fees must be determined, then, in the same manner as they are determined by physicians and surgeons. If his responsibility is not as great in degree, it is the same in kind. Considered in detail, there are quite a number of factors that have to be taken into account by the physician or the surgeon or the lawyer in making up accounts for services rendered. The physician considers the gravity, or unusual character of the disease for which unusual abilities are required. The surgeon, in estimating the value of his operations, follows the same general rule. For very difficult and dangerous operations requiring the highest order of skill, by common consent, he is justified in demanding more than for the performance of operations that the average man can safely and successfully perform. The lawyer is governed by the same general principle. If his long experience and great abilities make it safe to intrust vast interests to his care, he is entitled to charge a correspondingly large fee. Of course, the time given to the case is taken into account, particularly that spent upon it by assistants,—but it is of minor importance in many instances. The same principle should apply in dental practice.

And yet, after all that has been said of the higher privileges of professional life, it must be stated that, practically, in every community, the law of supply and demand operates in regulating professional fees, as it operates in fixing the values of commodities in the business world. Though a man be overweighted with wisdom, if he is not in demand he cannot command higher fees. The man who is wanted by the public is the one who can make his own terms. If he is without knowledge or skill he will not be wanted, so that we are brought back to the original proposition that it is knowledge that gives men power and makes them free.

But there must be some acknowledged system, and the doctor for his ordinary work charges so much for a visit—within certain limits of distance—and so much for an office call. The surgeon does the same. I am told by an eminent lawyer that formerly, to a greater extent than now, fees were imposed for the drawing of different documents, and for particular items of work, but at the present time ordinary office work is estimated, for the most part, on the basis of time.

Of course, in the specialty of dentistry the same need has been felt for a system applicable to the detail of ordinary office work. This has resulted in the establishment of two systems, that of charging a fee for each separate operation and that of charging by the time consumed.

The real object of this paper is a comparison of these two systems, and all that has gone before is only preliminary to that comparison. But the consideration of the subject is certain to lead us into a tangle of contradictions from which it will not be easy to emerge with absolutely unassailable conclusions.

In the early days of dental practice, as far as we have been able to learn, it was customary to charge for each particular operation, or, rather, for each particular filling ; the cleaning of the teeth, treatment of the gums, and sometimes even the extraction of teeth being "thrown in." This practice prevailed even after dentistry, by the establishment of the first dental college, became a distinct profession, although there is some evidence to show that unspecified fees were charged for professional services by those who were most influential in thus lifting dentistry to a higher plane.

This system of charging separately for fillings has come down to the present day, amplified by charges also for various other minor operations in the mouth, and is the one adopted, probably, by the majority of dentists throughout the world to-day. It is a system possessing much merit. This must be true, or it would not be so generally adopted. But it has some serious objections, which will be considered later.

One reason why it is so generally adopted can be found, doubtless, in the fact that it has been so long employed. It is natural and easy for men to follow in the beaten track. Children imitate their parents, and parents imitate their ancestors. Whatever comes down by tradition commands respect from many. Only here and there will be found a bold spirit who ventures to mark out a new path.

The early dentist itemized his bill ; it could be made more impressive and convincing by a long list of separate operations. The same is done to-day by men who are called good business men. I once heard a fine operator say he considered that he made his bills more impressive by giving many details. The system of charging by the operation, however, is one entitled to great respect, and in a certain way is in line with the law we have tried to lay down in reference to the estimation of the value of one's own skill.

A man of large experience and great skill may be able to put in a filling in shorter time and do it better than another, and for that he is entitled to charge a distinct and higher fee. And a filling, like a doctor's visit, represents a distinct thing, and so affords a seemingly real basis for the fee. It affords something tangible for the lay mind to grasp, and thus saves the trouble of educating the patient to an understanding of the higher meaning of professional service.

It may also be satisfactory to a conscientious man, who, considering that he is to charge for a distinct filling, may feel that it should be made a work of art, and he will take time enough to complete it to his own satisfaction, even if he is not to be liberally paid for it. If the filling is very small and not worth the minimum fee, he will offset it with a larger filling for which he will not charge more than his minimum fee. For large fillings that require more time and effort, and difficult ones that require more skill, he will increase the fee in accordance with his own judgment. This method enables him to work slowly or rapidly as he may feel inclined. He may stop to talk for a few moments with his patient, or he may leave the office for a little time, without affecting the result. If there is a loss of time it is his own loss, as it is fair to assume that the time of many of his patients is not nearly as valuable as his own. He is his own master. The system is elastic, and well suited for men of certain temperaments.

There is a certain dignity about it that satisfies a man who respects his calling, and believes the teeth are of incalculable value, and that every operation that will help to save them is worthy of being performed most carefully, and should, therefore, be separately charged for.

There are, however, some serious objections to this system when considered from another standpoint. The same set of conditions can be made to assume an entirely different aspect by following another line of reasoning.

It may seem petty and commercial to keep an account of every little filling and to magnify every little operation. It may be debasing to think of what one is to get for each thing he does. The large, free, manly sense of benefit rendered by generous service is forgotten in the effort to keep an account of the little things done.

The adding up is like the task of a clerk in a country store. It distracts attention from the professional aspect of the case. It holds out temptations to those who are not conscientious. A man lacking in love for his work and anxious to make it profitable may linger over a minute filling in order to seem to deserve the minimum fee, and will hasten and slight the large filling in order to put in as many as possible in the shortest time. If there were only fillings of fairly uniform size to be done, there could be no fairer way than to charge for the operation. Each filling would be something tangible, like a physician's visit or an office prescription.

But the work to be done in the mouths of most patients consists of a thousand and one little things that can hardly be described and enumerated, such as the preparation of cavities, the placing of temporary fillings, removal of tartar, treatment of gums, treatment and removal of pulps, cleansing of roots, filling of minute fissures and pits that require but a few moments each, and the repairing of old fillings.

The great improvements in modern methods, by which operations are more rapidly and more perfectly performed, render an adherence to the old standards of enumeration unfair and also unwise, for, as Dr. Jack long since pointed out, the advantages from this source must not be reaped entirely by the operator, but must be shared with the patient. No system can long stand that does not recognize this fact.

The products of our laboratories, such as artificial crowns and partial and complete dentures, which are entities in themselves, may, perhaps, be charged for as such, but the correction of irregularities can be justly charged for only under the head of professional services.

The system of charging by time is one that has many advantages, and it seems to be one that is growing in favor in these modern times. But it has also serious objections, which will be noted later.

Time is an important element in our modern life. Never before in the history of the world did it count for as much as at the present day, and never before was it so taken as a standard to gauge and measure human endeavor. Emerson said, there is no gift so great as the gift of a day. The subjugation of the electric current has accelerated the pace so that we may now say there is no gift so great as the gift of an hour! If human life is lengthening, as statistics show, and is growing more intense, as we all know, it is easy to see that much has been added to the possibility of human attainment during a lifetime, and it is only natural that the day or the hour should be taken as the measure of human labor. It seems only natural, therefore, in the readjustments that are constantly going on, that professional men, in seeking for a more convenient means of estimating the details of their services, should adopt the hour system.

For the dentist it is convenient, and for his patients it is easily understood. It has one very great advantage—almost the greatest of all—in the fact that the patient and operator start off with a distinct understanding. Those who wish to know to what extent they are incurring indebtedness, while their work is being done, can easily tell by keeping an account of the time. In this way there may be saved the surprise that often is felt at the presentation of an unexpectedly large bill, because most patients, without keeping, as far as they can, their own account, do not realize how much time has been given them. It is a system that, when rigidly enforced, insures promptness in keeping appointments on the part of both operator and patient, and in a great measure it removes that *bête noir* of a busy professional man's life, the habit many patients have of consuming time by indulging in endless and aimless talk. It gives to the operator a sense of freedom in the performance of his work. He has nothing to think of but how he can make his operations most perfect. Knowing that he will be paid, like a man who is pensioned, he has no concern except to do his work in the best manner.

Haydn, who was practically pensioned by Count Esterhazy, had nothing to think of but the composition he was to place on the breakfast table the next morning, and to this fact can doubtless partly be ascribed the happy, sunny character of his beautiful music, which will ever be a joy to the world. By this system an operator may indulge in the pleasure that comes from doing work well, with the certainty of being paid for it, and at the same time he can feel that, by taking plenty of time, he is conferring a greater benefit upon his patient. There can be no question that this system has done much toward placing American dentistry in the leading position it occupies in the world to-day, since in America it was first adopted. It is applicable and just as applied to nervous and unmanageable patients and to ungovernable children, since it secures to the operator compensation for his time, even though he is not able to do much work. This certainty of compensation is a professional man's right. It is due him in return for a life spent in preparation for his work. It justifies him also in making a charge for appointments not kept. This system avoids the petty consideration and enumeration of particulars, and this, it seems to me, quite offsets the charge sometimes made by those who oppose it, on the ground that it is degrading for a professional man to put himself on a par with a day-laborer, whose work is estimated by the hour or the day. All men who work, either with their hands or their brains, are laborers, and it is no more degrading to estimate work by the hour than by the piece. The true difference is shown by the difference between the professional man's ten dollars per hour and the laboring man's one dollar and a half per day. The true professional man cannot be degraded by such childish reasoning as that.

In considering the objections to the time system, it is possible to again put a different construction on the same set of conditions.

We meet at once the greatest of all objections, and that is that skill cannot be estimated by time. As stated before, it is something that does not allow of any such measurement. It can only be estimated by its results, and they may be entirely independent of time.

The man of age and experience must not be put upon the same plane with the youngster whose spurs are not yet won ; and yet, in the estimation of the unthinking public, that is the tendency of the time system. And it also imposes conditions that are not fair from the fact that men are not always in uniform health.

A man may sometimes do in an hour what at another time, owing to physical disability, he might not be able to do in an hour and a half, or even two hours. One way in which this may be overcome is by Dr. Jack's system of charging by what he considers a fair hour's service, which may sometimes require an hour and a half of time. And this brings us back to the point of the professional man being, after all, the only judge of the value of his own services.

Another serious objection to the time system is that it imposes a system of half-conscious bondage. It implies a constant watching of the clock, and an ever-present remembrance that on a ten-dollar-an-hour basis, every minute is equivalent to over sixteen cents ! This fact hangs over a conscientious man like a cloud through which no ray of light ever comes. It is the refinement of the master's lash, ever goading him to constant work. There is no escape from it, and it must be counted as one of the unconscious factors that wears a professional man out. It lessens the force of the former statement that there is great pleasure in taking abundant time in order to do the work well.

An unconscientious man may not feel this. In fact, if he has not a full practice he may think that every minute gained by spinning his work out adds sixteen cents to his income. Another objection to the system may arise from striving to do a great many fillings in the hour's time, in order to be considered a rapid operator, and therefore not a high-priced one, even though having a high rate per hour. This must inevitably lead to the performance of poor work, for there is no greater truth than that "haste means waste." Still another objection to the time system is that patients also watch the clock, thereby constantly reminding the operator that he must not lose a minute.

Dr. Corydon Palmer once said to me, with the feeling of the true artist, "I will not allow a patient to snap a watch on me!"

Then, too, there may exist an element of unfairness arising from the fact that one man may be orderly and methodical, and have trained assistance at the chair, and yet, in an unthinking community, may not be able to command a higher rate per hour than one who works alone, and with old-fashioned instruments, which he keeps in a careless manner.

If the time system is adopted, it seems to me that the only way in which it can well be applied is to have no fixed charge for an hour's service, but to have a wide range between the minimum and the maximum charge. For instance, instead of making the charge ten dollars per hour, let it be from eight to twelve dollars.

After comparing and contrasting the two systems, we have found that each possesses marked advantages, and each embodies distinct disadvantages.

How, then, shall we decide between the two? This cannot be done in an arbitrary manner, as, in addition to the many difficulties we have found, the matter of individual temperament plays an important part, and there must be allowed great freedom in deciding a question that is so personal in its nature. On general principles it can be said that a man who can be trusted to perform professional work can be trusted to make the charge for it.

In my own practice, and in reply to inquiries as to my fees, I have always taken this ground. I never speak of fees when it can be avoided. I want to feel, and I want my patients to feel, that the work is of first importance, and that the fee, as a matter of course, will be what it should be.

If patients cannot come to me with this feeling of confidence, I prefer not to have them come to me at all. I have recognized the fact that there is an advantage in a fee card, since it enables the patient and operator to start off with a distinct understanding, and in the last twenty-five years I have prepared at least half a dozen, all based upon the idea of a combination of the two systems; but I never had but one printed, and that, many years ago, I withdrew after a few months' use. I have never had the courage since, when it came to the point, of having another printed. Although I believe it would be helpful from a business standpoint, I could not overcome the feeling that it was not quite the thing for a professional man to do.

As far as possible we must rise above the conditions indicated in the two systems, and, taking a wider view of professional life and its obligations, must exercise the liberty before spoken of as the supreme prerogative of educated men. We must shake off the traditions of the past, and, discarding our appointment cards containing a price list of our fees and our itemized bills, place ourselves upon the plane occupied by physicians and surgeons, who never stoop to such a practice. If we claim for our profession, as we do, that it is a specialty of medicine, we must adopt the methods employed by the parent profession, not only in our intercourse, but in the method of determining and indicating our fees. The comparison of the two systems shows how difficult it is to evolve any comprehensive rule that shall be applicable to all cases, so that, if there were not the higher professional consideration to guide us, it would be still difficult to establish any system that would be complete in itself, and that could be given to the world in any tabulated form. We must have a system ; that is admitted, and I think it will be found in a consistent combination of the two we have considered, but we must follow the lead of the parent profession and not publish it to the world. It would be a surprise to us to receive from our family physician a card stating that visits will be made at such a rate, or office calls received for so much, or a notice from his brother, the surgeon, stating that legs would be cut off at such a price ! A new patient has the right to inquire regarding our fees, and we should be prepared to give a frank outline of them ; but it is not in keeping with true professional dignity to thrust them constantly upon the notice of patients.

Nor is it quite in keeping with that fine relationship that should exist between the professional man and his patient. There is an old saying that the world estimates us in accordance with our own estimate of ourselves. If we retain the appointment card, with the list of prices, or the rate per hour, we shall also inevitably retain in the minds of our patients the memory of our origin.

Our profession did not branch off from medicine as a distinct specialty, receiving from the first the fostering care all the later specialties have received. It has independently, and by its own efforts, grown up to it, and has compelled recognition even in spite of the neglect shown it in the past, and the coolness shown it still in some quarters. Let us, therefore, eliminate as far as we can all suggestion of the past, when, single handed, we did the best we could, knowing even then that in the fullness of time a profession founded upon such a universal need of humanity must receive just recognition and appreciation. Claiming for ourselves to-day what we know the world grants us, the honor of forming one of the most useful specialties of medicine, and in the fullness of that knowledge standing upon the high ground we have won, and accepting the methods of our adopted parent, whom we honor but do not ape, let us look forward to the time when a fee card and an itemized bill shall be a memory of the past.

Assuming that we belong to the society of modern kings, let us take on the manners of the true king, and believing in ourselves and in our mission in the world, let us exercise the prerogative of those who labor and those who rule by divine right.

With this rule to guide us we shall become free, and rising above the details of our daily work, and putting aside this microscopic study of all its conditions, we shall make our charges and send our bills for professional services, and for those alone.

DENTAL EDUCATION OF THE PUBLIC.

BY ANDREW J. FLANAGAN, D.D.S., SPRINGFIELD, MASS.

(Read before the Massachusetts Dental Society, at Boston, June 5, 1896.)

HUMANITY with all its advancement has not been able to make any individual independent of others in his existence. For the last few years we have all noticed in the various journals the plea for education of the public in the care of the mouth and associated parts, but more particularly the discussion of what a dentist is supposed to know and do for the public. In dentistry, as in most callings, a clientele can be separated into many grades of intelligence, and that grade the members of which are intelligent enough to co-operate with their dentist in all that is necessary is small when compared to the others. The man with the refined, moneyed, and intelligent following knows little of the misunderstandings and vexations connected with a practice largely made up of the unrefined, poor, and average-intellect people. From the truly professional standpoint these last are as worthy of attention in their troubles as the first, and it has seemed to the writer that many misunderstandings have arisen in a practice of this character because of the practitioner's negligence and faulty teaching.

I had been in my office not over one month when a fairly-educated woman came to me suffering from a slight case of pericementitis, abusing a dentist because a pulpless tooth was sore, claiming he could not have treated it properly, for "how could a dead tooth ache?" Here is a case where more mistakes arise—on the part of patients—than from any other operation, and to my mind it is because of the practitioner not explaining, and to his using the word "dead" in place of pulpless. The word dead commonly means that which has passed from existence and cannot trouble. Again, they are told these teeth will be free from future pain. The suggestion is here offered that we cease using the word dead in that connection, and in treating teeth of this nature that we have a split tooth at hand to show to patients what we have done, and to impress on their minds the fact that the operation is not a panacea against toothache, and that a tooth can cause trouble from inflammation of the pericementum as well. What practitioner has not had people ask him to kill the nerves in their teeth before filling, so there could be no pain ever again in that tooth or teeth?

The administration of ether in dental practice is a source of much annoyance. Very many dentists do not give anesthetics, but call in a physician to perform the administration. This is an operation possibly involving life or death, and is therefore looked on with the gravest thoughts by our patients; so when a dentist says he must have a physician, it means to them an evidence of weakness on the part of the first and one of strength in the latter. Why a dental practitioner who has a proper knowledge and training should not make a physical diagnosis and administer anesthetics is difficult to understand. If dentistry is to broaden and develop on true scientific lines, this is one place where a radical change will have to take place. I am sure if one of us were to employ a lawyer to conduct a case for us in court, and he having tried it in the lower court himself, then, when it reached the higher court, employed some one else to conduct it, we would consider it an evidence of weakness on the part of our lawyer, and that he was not competent.

At times there arise in all practices cases which require the internal administration of drugs ; yet it has been my experience that the public are of the opinion that this is not within the domain of dentistry. In pericementitis, pulpitis, etc., the administration of narcotics is indicated and accepted as good practice, likewise the use of nerve tonics and sedatives in other cases. It has been my thought that the writing of a prescription in regular Latin rather than in English would help us in the prescribing of drugs for our patients and in their use by them.

The cause of and nature of decay of the teeth is understood by few people other than dentists. It is a most common thing to hear A or B say they cannot understand why they have to spend so much money each year to save their teeth, when C spends but a few dollars and never has recurring decay. Perhaps patients do not trouble themselves to ask questions relatirg to the cause of decay and loss of teeth, yet this should not prevent us from, but rather stimulate us in, imparting knowledge which will benefit both our patients and ultimately the good name of dentistry. Apropos to the subject of decay should be mentioned the use of the brush, floss silk, powders, and mouth-washes. There is a great need of insisting on means to keep the mouth in a hygienic condition.

A question often asked is, How long will this work last? On questioning the patient it may be found that they are filled with the idea that Drs. So and So guarantee their work to last for so many years, and some, even, forever. This is a bad policy for the dentist and the good name of our calling, for nothing lasts forever, and you may expect at any time the return of your guaranteed work in an imperfect state. Dental operations are governed in their lasting qualities by something other than perfection of workmanship, and the people should be taught this with great force. Some philosopher has said, "The ignorant say it is so, the wise it may be so." There is no such a thing as permanent work, when viewed from the standpoint of an intelligent knowledge of the conditions surrounding it. Many patients refuse to save their molar teeth as carefully as the incisors. Chronic dyspepsia arises at times from the inability to thoroughly masticate, due in many instances to loss of grinding power, and physicians are now sending cases of this nature to the dentist for treatment.

Medical men who have a knowledge of our work can assist us in many ways, and a friendly professional relationship with them should be cultivated. A profitable use could be made of the systems of physiology and hygiene used as text-books in our public schools. In many of these are chapters relating to the teeth and associate parts, and if those chapters could be prepared by a dentist in a manner to be practically instructive, benefit in a lasting form would ensue. However we may be pleased to be called good mechanics, yet we do not wish to have people think that our calling is purely mechanical and has no basis in science or relationship with art ; intelligent people there are who consider us fair mechanics and nothing more. Our work has been decidedly mechanical in the past, and even at the present time is practiced by some only as such, but the day is at hand when the light of knowledge and investigation has worked a change in this view. The few men who have taken advanced positions and have coined that new word, stomatology, are on the correct pathway to legitimate and rational dentistry. The day will soon pass when a brother practitioner will be followed in his teachings, unless he can give a logical reason for his ideas ; too much credence has been given in the past to the authors of visionary procedures in our calling. That a thing is so because it is so is a weak woman's reasoning, and it will never do to build on such foundations, lest the structure reared should topple over. When we hear of men who have had failures and disappointments and who have wrested success from such conditions, these are the men to heed, for to overcome failure is the certain pathway to success.

Patients who think dentistry is merely a mechanic art are liable to estimate our fee as proportionate to cost of material used. When this has happened, it has been more the fault of the practitioner than of the patient. When we estimate our fees as physicians do, our services will be better understood and appreciated. Persons suffering from a wound, fracture, lesion, or disease of the oral parts seek, as a rule, the services of a physician, because of their contracted ideas of what dentistry really is.

That all these things are true in the main will be generally admitted, and the question is, what are we to do to better it? Elevate the standard for entrance and graduation in our colleges, and then, when a student graduates, let him be prepared to do dental surgery in the broadest sense of the word, so that he will be competent to compete in the domain of oral surgery with the medical profession ; then will dentistry take its place in the minds of the public without question as to what it can do for humanity.

THE DISINFECTION OF PULPLESS TEETH.

BY JOSEPH W. WASSALL, M.D., D.D.S., CHICAGO, ILL.

(Read before the American Dental Association, August 5, 1896.)

ARE current methods of practice in the treatment of teeth with necrotic pulps strictly in accordance with modern views of asepsis? Judged by what is said and written for societies, periodical literature, and text-books, which may be presumed to fairly represent the methods in common use, this question must be answered negatively.

It would seem then that no apology is required in bringing before you so trite a subject ; on the contrary, if the inference which my question raises is correct, it is eminently appropriate that this representative body should give the matter its serious consideration.

Given a tooth with a decomposing pulp, what is the nature of the pathological state with which we have to deal? We find a condition in which the pulp-chamber, root-canals, and dentinal tubules are loaded with putrefactive animal matter. One has but to recall the large amount of soft tissue contained in dentine and its formative organ to realize the danger of the situation. The recent analyses of dentine made by Dr. G. V. Black, and reported by him in the

Dental Cosmos for May, 1895, give an average of 25.36 per cent. of organic matter, and 10.06 per cent. of water. The pulp would constitute additional soft tissue, amounting to about one-third of the bulk of the dentine. Now, while the removal of this necrotic mass from the chamber and canal, and the disinfection and filling of the vacated space, is a manifest necessity, and is the general teaching and practice, I contend that there is not a general appreciation of the fact that the dentine itself continues to remain septic.

It is for the purpose of emphasizing the necessity for scientifically sterilizing this putrid zone of dentine that this paper is offered.

What is the chemical and physical nature of this putrescent soft tissue? Putrefaction is a fermentative decomposition in dead animal tissue, produced by a class of micro-organisms termed saprogenic bacteria. Professor W. D. Miller, in his "Micro-Organisms of the Human Mouth," 1890, says, "The fermentation of nitrogenous and more particularly of albuminous substances which is accompanied by the development of large quantities of gaseous and stinking products is called putrefactive fermentation or simply putrefaction." The definitions given in the latest editions of Foster, Gould, and Dunglison are almost identical with the above.

McFarland ("Pathogenic Bacteria," 1896) describes the chemical changes taking place in the process of putrefaction as follows: "The first step seems to be the transformation of the albumins into peptones, then the splitting up of the peptones into a large number of gases, acids, bases, and salts. In the process, the innocuous albumins are frequently changed to tox-albumins, and sometimes to distinct animal alkaloids known as ptomaines." To quote Miller again (ibid): "This name (ptomaines) has been given to certain waste products of bacteria closely resembling vegetable alkaloids which are formed in putrefying mixtures."

Ptomaines have exceedingly poisonous properties. According to Brieger (an authority on this subject), they have an action on the animal body similar to snake-poison and curare. Extended researches into the nature of these substances made by Bergman, Panum, Brieger, Suelzer and Sonnenschein, Vaughan, and others prove that their toxic properties abundantly suffice to produce the violent inflammatory phenomena which are observed to follow the contact of putrescent pulp matter with the living tissue. Is it not apparent, then, that the mere enucleation of the canal contents and a single application of any known antiseptic is insufficient to sterilize or render permanently innocuous these deleterious alkaloids? Yet every day such doctrine is enunciated, and such methods are advocated and have authority because they pass unchallenged.

There are three classes of cases in which we have pollution of the dentine by putrefactive products:

1. Teeth the pulps of which have perished from encroachment of caries, the pulp-chamber being open.

2. Teeth the pulps of which have died from proximity of a large filling, attempts at capping, or insufficient sterilization of the layer of caries allowed to remain over a pulp.

3. Pulpless teeth the canals of which have been imperfectly filled or sterilized, or both.

A tooth the pulp of which has been devitalized intentionally is excluded from consideration in this connection for the reason that, under ordinary aseptic precautions, putrefaction does not occur.

The essential pathological condition to be recognized is the same in all three classes given. We have dead dentine infiltrated with matter highly irritating and poisonous to living tissue in intimate contact with vital cementum, which, in turn, is closely enveloped in pericementum.

What must the effect be on the cementum and peridental membrane of the *materies morbi* which are present in the underlying dentine?

There is no escape from the conclusion that it must account for many morbid conditions and symptoms, the etiology of which is otherwise obscure. There are, no doubt, exceptions—many of you may call them to mind—of teeth in this state which cause no discomfort. But a little more time may prove that even these cases will not continue quiescent. Unquestionably, this condition is responsible for numerous affections, more or less difficult of diagnosis, varying from reflex neuroses to remotely situated abscesses, the only subjective symptoms in the causative tooth discoverable being a slight sense of lameness in mastication or to palpation.

What treatment does this pathological state indicate? It will not be uninteresting to first notice some of the methods which have of late been prominently set forth.

The Transactions of the World's Columbian Dental Congress contain an article by Professor Miller, entitled, "Concerning Various Methods Advocated for Obviating the Necessity of Extracting Devitalized Tooth-Pulps," in which, while recognizing the greater value of complete root-canal filling, he advises for general practice the removal of the bulbous portion only of the pulp, and the covering over of the remaining portion with a tablet composed of slowly dissolving antiseptics, such as sublimate and thymol combined. The distinguished author confesses that teeth so treated inevitably give trouble, if the victim lives long enough, which is condemnation sufficient.

This, together with other variations upon the process of mummification, as advocated by Witzel, Herbst, and Söderberg, are only temporarily effective, because, to use Dr. Harlan's words, "they will not stay mummified."

Is it not a fact that the only pulp which may be successfully mummified is the living pulp? or, to be more accurate, the mummifying agent must be applied before pulp death. This would explain the observed efficacy of the oxychlorid of zinc pulp-capping operation.

Emil Schreier, at the same congress, presented a method of destroying pulp-remains with a mixture of sodium and potassium, which is objectionable on the ground that the action of the drug does not extend into the entire depth of the tubules. Dr. J. Foster Flagg, a name which has far-reaching influence, in a paper read before the New Jersey State Dental Society (also published in the DENTAL COSMOS for March, 1895), places the stamp of his approval upon this unscientific procedure. He says, "I desire to combat to the utmost the claims of thorough removal of pulp-tissue as a matter of *first* importance." He also makes use of fifty per cent. solution of sulfuric acid for opening up the putrescent canals, which is contraindicated because it is a coagulator of albumen.

Dr. M. L. Rhein, in a paper read before the Second District Dental Society of New York and published in the DENTAL COSMOS for March, 1896, presents his method of treatment of acute and chronic alveolar abscess. The treatment he therein outlines is insufficient for the disinfection of putrid dentine. It is inadequate to the requirements of the condition, because the disinfectant applications are not continued for a long enough period of time. He also falls into the error of using coagulating agents for the first surgical dressing, when it is quite probable that at the time the tubular structure of the dentine contains albuminous matter.

Professor Frank Abbott has written a work on Dental Pathology and Practice, which, owing to the author's eminent position both as an educator and a practitioner, will be widely read. It is peculiarly unfortunate for the younger members of the profession, whose methods are most likely to be influenced by it, that that chapter devoted to the consideration of this question should be so inconsistent with modern bacteriological knowledge. It is somewhat startling to find that "until within a comparatively few years there was no apparently rational or successful treatment for pulpless teeth except extraction."

Shades of Parmly, Townsend, Harris, Maynard, and Atkinson! The filling of root-canals has been orthodox dental practice for more than half a century. There are many gentlemen present at this meeting who have filled canals for thirty-five or forty years. Dr. McKellops told me yesterday that he recently saw a tooth still in the patient's mouth in which he filled the root-canal with gold foil over forty years ago. Dr. Corydon Palmer has filled root-canals since 1839. Dr. Abbott imparts a lucid understanding of the *fact* of putrid dentine and the conditions to be overcome, but the treatment proposed is contrary to the commonest laws of asepsis. The triumph of modern surgery is secured by striving to prevent the entrance of germs into, rather than their destruction after admission to a wound. How hazardous to teach that a pulpless tooth may be operated upon without first adjusting the rubber-dam. The neglect of this precaution against the ingress of the myriads of micro-organisms which are always present in the human mouth is hardly excusable at this day.

Dr. Abbott also recommends the use of bichlorid solutions for syringing out the pulp débris. This is of doubtful utility, because, like nitrate of silver, it is at once precipitated in the presence of albumins, thus losing its germicidal and antiseptic powers. (McFarland.)

It is also bad practice to pump zinc chlorid through a tooth to cauterize a pus-sac until a course of treatment for sterilization of the dentine with diffusive disinfectants has first been completed.

These few criticisms are submitted in order to substantiate the charge made at the opening of this paper, that much of the modern practice in the management of pulpless teeth does not conform to the proper status of bacteriological science.

The successful treatment of teeth contaminated with putrid pulp matter would, to my mind, seem to depend upon the strict observance of two details of procedure.

First. The exclusive *use* of diffusible disinfectants.

Second. The repeated and continued application of the disinfectant dressing for a sufficient length of time.

The reason why I give diffusible disinfectants the preference over coagulating drugs is because I am satisfied that their exhibition at the pulpal orifices of dentinal tubules forms a plug of coagulated matter which prevents the further ingress of the disinfecting agent, imprisoning within the tubules putrefactive matter which will be a permanent source of irritation to the cementum and pericementum.

Again, if the position so ably maintained by Truman and Kirk is true, but which is not substantiated, that the entire contents of the tubuli are coagulated, there is nothing gained, for the resulting mass, it is well known, is suitable pabulum for micro-organisms. Hence there would be no assurance that putrefaction would not recur within the tubules.

As bearing upon the controversy regarding the relative merits of coagulating and diffusive disinfectants, I desire to draw attention to some recent experiments reported to the Iowa State Dental Society in May, 1895, by Dr. Harlan. The starch and iodin test was employed. Freshly-extracted teeth had their pulps removed and their foramina sealed. Root-canal dressings of coagulating disinfectants were then applied in the usual manner, and the teeth immersed in starch solution up to their anatomical necks. The characteristic blue color did not appear in the starch solution, showing that the root had not been penetrated by the iodin. The iodin itself is a coagulator of albumen, so the experiment was also made by using the iodin alone in the same manner, omitting the carbolic acid No indigo color appeared, demonstrating that its coagulating effect on the contents of the tubuli was an effectual bar to its diffusibility.

It is difficult to reconcile the diametrically opposite results which seem to be obtained by Dr. Harlan on one side, and Drs. Truman and Kirk on the other. Perhaps the very complexity of the processes in experimentation and the peculiar delicacy of the handling required would account for some of the discrepancy. In the experiments, for instance, of Dr. Kirk, when the teeth were suspended in egg albumen, is it not possible that the apparent coagulum which is reported might not have been a growth of micro-organisms? The medium used and some of the conditions present were certainly favorable to a culture. Then, again, a very important point seems to have been entirely overlooked. If the putrefaction of albumen has advanced far enough, we no longer have albumen, but ptomaines, which are not coagulable. Thus it would be an easy matter to demonstrate either side of the question, tenable according to the degree of decomposition of the animal matter within the dentine. This latter point seems to force us to the conclusion that inasmuch as it is impossible, with our present knowledge, to accurately determine the stage of putrefaction with which we have to deal in a given case, the only safe course is to assume that coagulable material is present. Albuminoids, peptones, and ptomaines are soluble in the diffusible penetrating drugs used in this condition, but are not soluble in coagulating agents unless such agents are diluted to a degree where they are no longer efficacious as disinfectants. In the investigations thus far published, the preponderance of evidence seems to be in favor of the avoidance of the coagulating drugs in the roots of pulpless teeth.

The second requisite to success in the disinfection of putrid dentine mentioned was the element of time. How long shall the dressings be kept in the canal before it is proper to fill the canal? Until the dentine is permeated throughout its entire depth, and until all micro-organisms and their spores may reasonably be expected to be destroyed.

My own observation is that these results are obtained in not less than twelve days,—oftener sixteen or twenty,—and in some few cases a longer course of treatment is required. The dressings should be changed every four days until no stain or odor is perceived on the cotton dressing other than the drug employed. Even though the dressing may come away clean on the fourth or eighth day, and you are morally certain that the bacteria are killed, it is imperative that the use of the drugs be continued for the full period, in order to also kill any spores which may be present, for they offer much greater resistance to germicides, and hence require more time for their destruction.

THE ORBICULARIS ORIS AND THE MUSCLES OF EXPRESSION.

BY W. C. BARRETT, M.D., D.D.S., BUFFALO, N. Y.

(Read before the American Dental Association, August 5, 1896.)

THERE are a thousand millions of people living upon the earth, and no two of them resemble each other so closely that they cannot be distinguished. The characteristic differences are mainly found in the facial features, and in them the diversities are produced, partially by modifications of the facial and cranial bones, but more especially by variations in the development of the facial muscles, the most expressive of which is the orbicularis oris.

It follows, then, that our principal means for the identification of our friends and acquaintances is in the special development and functional action of this, the most wonderful of all the muscles of the body. When we consider the marvelous diversity of the expressions which the human countenance can assume, when we remember that pleasure, grief, rage, scorn, love, indifference, pride, jealousy, devotion, elation, melancholy, fear, hate, hope, and a hundred other sentiments and passions, with all their modifications, can be clearly and unmistakably expressed by mere contractions and relaxations of these muscles, we begin to comprehend something of the amazing variety of the combinations that may be formed by their union. The more compound a set of muscles, the greater the range of its mobility; usually, however, at the expense of its muscular power. Even the features of the stolid, unimpressionable, phlegmatic boor clearly present at times of excitement the workings of his uneducated, untrained mind. When we compare with this the language in which the muscles of the trained pantomimist speak, we get a glimpse of their capabilities.

Nor is it alone upon the voluntary muscular contractions that the actor relies for the portrayal of human emotions. He uses appliances for the mechanical distortion of them, that he may the more readily assume special expressions. It is well known that the tragedian and the comedian introduce material into the mouth for the distention of certain muscles, holding them in permanent distortion in their "make up," that by the action of certain other muscles in combination with them exaggerated expressions may be produced. An invisible hair or thread is used to draw up or down certain facial attachments, thus to produce some special combination. Men so disguise themselves by artificial means that they are not readily recognized by their friends. Criminals, by certain very simple surgical operations, so alter their whole expression that detectives are unable to identify them. Squint, or cross-eye, can be produced or obliterated almost at will. Slight permanent contractions of certain muscles can be induced by simple operative procedures that shall entirely change the expression of the whole face. We, as dentists, know the marvelous modifications that can be brought about through a change in the position of the teeth. We have witnessed the complete mutilation that has been caused by the insertion of an unskillfully constructed artificial denture. I could not, then, select a subject that should more directly appeal to those who are constantly engaged in working upon the human face than to present before them a brief study of one of these expressive organs.

The orbicularis oris is the most complicated and involved of the muscles of the human body, whether we consider it from its anatomical or functional aspect. It is commonly considered a sphincter, but it is very far removed from this class, in that none of its fibers are continuous about the cavity which it surrounds. It is not a simple muscle, but is made up by the intermingling and intercommunicating of a large number of facial muscles. In fact, the distinctive fibers of the orbicularis are comparatively few, passing only across the lips, and not around them. The compression of the mouth is not even produced as in the eye, in which the orbicularis palpebrarum passes nearly around. The mouth cannot be completely pursed up, as with a true sphincter, but it can be drawn together by the combined action of a considerable number of muscles. Its expressiveness is not produced by a simple muscular action, nor can any of the passions be portrayed by any one set of fibers. The marvelous changes are brought about by combinations made possible through the intercommunication already referred to.

The orbicularis oris is the common meeting ground of all the muscles of facial expression. Fibers from each and every one of them communicate, either primarily or secondarily, with the true orbicular fibers. Even the muscular portion of such a distant one as the occipito-frontalis has its means of communication, and from the clavicle to the coronal suture there is a functional union of all the expressive muscles of the face and head. The mingling of the fibers of all these muscles makes the structure of the orbicularis very complex. Muscles like the depressors and the levators, the filaments of which are arranged at right angles to the margins of the lips, crossing it, give vertical fibers. Those of the buccinator, the risorius, etc., added to the longitudinal fibers of the orbicularis proper, furnish transverse filaments, while a third set run diagonally across, obliquely between the other bundles, from before backward, and from the skin to the internal mucous membrane.

The muscle, as a whole, may be divided into the internal or labial, and the external or facial portions, according to whether the layers are mainly composed of the fibers of the superficial or deep muscles, but no accurate line of demarkation can be drawn, because of the diagonal fibers that interlace. The deep portion has but a restricted attachment to the bone beneath, that of the upper lip having the naso-labial slips, which give the prominence that forms the two vertical ridges near its center, dropping down from the cartilage of the nose, and another in the incisive fossa, while that of the lower lip is merely attached at the incisive fossa on each side. The superficial part of the muscle has no bony attachment whatever, but is held in position by the diverging muscles of which it is composed. This gives extreme mobility to the whole mouth, the lack of bony attachment accentuating it, for if the superficial fibers are strongly contracted and the diagonal ones relaxed, the lips are protruded, while if the deeper layers and the oblique ones are contracted, the lips are drawn against the teeth.

The buccinator belongs to the deeper layer, and its fibers decussating or crossing at the angles of the mouth, make up a large part of the transverse portion of the orbicularis. It has its origin along the distal line of the alveolar process of both the upper and the lower jaws, and in the pterygo-maxillary ligament behind, many of the fibers from the upper part crossing and forming a part of the orbicularis below, while those of the inferior part cross to be inserted in the upper lip. These decussating fibers are attached to the alveolus as far forward as the margin of the canine fossa, and they should dominate the shape of any artificial denture at this point.

The levator anguli oris, the levator menti, and the quadratus menti, belong to the intermediate layer, while the levator labii proprius, the zygomaticus major and minor, the triangularis menti, the risorius, and the levator labii superioris alæque nasi, with the fibers of the platysma myoides, make up the superficial layer. But certain fibers of nearly all these muscles cross and, accompanied by portions of the deep fascia, penetrate even to bony attachments.

It is not, however, the anatomy of these muscles that so much interests us as their function, and I desire to indicate in what way the expression of the countenance may be affected by malpositions of the teeth, or by unskillful operations on the part of the dentist.

First let us consider the levator labii superioris alæque nasi. The action of this muscle is to raise and slightly evert the inner half of the lip, and at the same time to lift the wing of the nose, and it produces an expression of disgust. It is especially used in sneering. In certain instances in which the central incisors are especially prominent, while the laterals are retracted, we have that peculiarly impudent and deriding aspect that is sometimes called the "squirrel-," or "rat-face." If an artificial plate be too prominent beneath it, there may be produced the vacant, idiotic look, induced by the compression of the oblique fibers of the orbicularis oris, and the consequent eversion of the labial edge.

A little nearer the angle of the lips, and above the cuspid teeth, but upon the superficial labial surface, lies the levator labii proprius. The action of this muscle is quite complex. With the levator labii superioris alæque nasi it raises the lip, everts it somewhat, and gives a peculiar sneering expression to the countenance. The carnivora in snarling bring this muscle into play, and thus expose the cuspid teeth. In connection with the depressor anguli oris, or trangularis menti, and the orbicularis palpebrarum, it is especially used in crying.

The closure of the eye by the contraction of the latter muscle assists in raising the lip, while the triangularis menti draws the mouth into the shape of a parallelogram, and gives a peculiarly lugubrious expression to the face. If the cuspids be unduly prominent, or if a plate lifts the muscle too much, the consequence may be, when the other muscles are at rest, a permanent sneer. With the contraction of the orbicularis palpebrarum and the triangularis menti, the face has an expression of extreme sadness.

The buccinator as a muscle of expression acts secondarily. From the peculiar direction of its fibers, when it is in contraction, the muscles of the deep layer are pursed up at the corners of the mouth, while those of the more superficial layer are peculiarly puckered by the consequent drawing of the levator and depressor anguli oris ; a deep wrinkle is seen at the angle, while the risorius is placed upon a stretch, and an insincere and mocking appearance is the result. This will be induced when an artificial denture is inserted that has no depression at the canine fossa. The superior decussating fibers of the buccinator are placed upon a stretch, and a peculiarly disagreeable expression thereby induced. The same abnormality of the natural denture, or the same improperly constructed artificial plate that thus unduly distends the buccinator, will act upon the levator anguli oris and intensify the disfigurement. This muscle raises the corner of the mouth, and at the same time draws it inward. When too much distended there must be a continued muscular effort on the part of the triangularis menti to keep the corners of the lips in place, and this results in a painfully strained appearance, and adds to the distortion.

The zygomatici, major and minor, are the muscles most used in smiling, as they draw the angle of the mouth upward and outward. When the zygomaticus major is strongly contracted, it draws together the tissue about the point of its origin, and causes a fullness in front of the malar bone. If now the orbicularis palpebrarum be contracted, the tissue between the origin of the zygomaticus and the outer canthus of the eye is peculiarly wrinkled, producing what are called "crow's feet," a disfigurement which ladies especially most earnestly desire to avoid. If both the zygomatics are placed upon a stretch by undue distention, the mouth is placed upon a perpetual broad grin. If, on the other hand, they are unduly relaxed, the triangularis menti draws down the corners of the mouth, and gives the opposite expression.

The risorius has its origin in the masseter, and its action is to draw the corners of the mouth directly outward. It gets its name from the former supposition that it was the muscle of laughter, but all the late anatomists know that this was a mistake. When it is contracted it gives an expression of pain. This is the case in tetanus, and the appearance in that condition is hence called the "risus sardonicus." If the first molar in either the natural or an artificial denture be placed either within or without the proper position, the risorius may be caused to give a very peculiar and painful expression.

The platysma myoides is not as much affected by the dentition as some of the other muscles. Yet there are few whose action is more complex. Arising as it does from the deep fascia of the upper part of the chest and neck, it is involved in all the muscular movements of the important pectoralis major, the deltoid, and the sterno-cleidomastoid. Its long bundles of fibers continue to the border of the jaw, where some of them are inserted. But others cross the lower jaw, and, continuing beneath the triangularis and the quadratus menti, are lost in the orbicularis oris, while the fibers crossing the angle of the mouth are mingled with and lost in the fibers of the levator labii proprius and the levator labii superioris alæque nasi. Hence any unusual exertion of the pectorals and the deltoid exhibits itself in the face. In heavy lifting, the corners of the lip are drawn down, and even the wing of the nose depressed by the strain placed upon the platysma, through its origin in the fascia of the muscles of the arm and chest, and its connection with the orbicularis oris and the levator alæ nasi. It cannot, then, be lost sight of in arranging the teeth, and its action upon the orbicularis oris needs careful study by the artistic dentist.

The depressor anguli oris is of course affected by anything that unduly contracts the levator anguli oris and the zygomatics. If, on the other hand, these muscles are left too lax, the depressor, or the triangularis menti, draws the mouth out of position. If the lower teeth are too prominent, or if a lower artificial denture places these muscles upon a stretch, it may easily be seen that not only will the symmetry and proper expression of the lower lip be destroyed, but that the opposing muscles of the upper lip will draw that also out of place. Especially must the natural expression of the canine fossa be retained, that the triangularis menti may not be distorted, and so the natural expression be entirely lost.

A very disagreeable fullness of the lower lip may be induced if an artificial plate too much distends the quadratus menti, or the depressor labii inferioris, and the levator menti, or levator labii inferioris. If the latter, especially, be strained by undue fullness near the center of the lower lip, it induces a peculiarly haughty, supercilious expression, which may do the wearer of it great injustice. This appearance may be brought about by malposition of the teeth, irrespective of either the natural or the artificial alveolus. If, for instance, the lower edge of an inferior plate be too thick at the incisive fossa, the origin of the levator menti, the point of the chin will be disagreeably drawn up. If now the teeth be placed too far back, the natural fullness of the orbicularis is not preserved, and the decussating fibers of the buccinator and those of the platysma will draw in the margin of the lip, and a peculiarly dogged, obstinate expression will be the consequence.

If a plate be too full at the canine fossa of the upper jaw, the levator anguli oris is distended and the corner of the mouth is raised, while at the same time the descending fibers of the buccinator draw up the inferior angle of the mouth, the risorius is pulled out of position, and a half-sneering, half-weeping expression is seen. At the same time, the zygomatics may be relaxed by the lifting of the lip, and there will be a distortion of the tissues covering the malar bone. Hence, by an artificial denture that has an undue prominence at one point, every expression of the face may be changed, and not a muscle that is connected with the orbicularis oris remain at rest in its natural state.

It would be interesting at this point to take up the comparative muscular anatomy of different orders of animals, and determine the character of each as expressed in the face. There is a peculiar development of the muscles about the mouth of each one, and it is always indicative of their individual or class traits. In the Carnivora, for instance, the levators of the upper lip are largely developed. This gives them the peculiarly savage expression that is so threatening when the anger of the animal is aroused.

In the Rodentia, the prominence of the central incisors brings the levators proprius into prominence, and gives them the impudent, saucy expression that is characteristic of that order. In the leporidæ, or hares, this is modified by partial separation of the superior labial muscles, the so-called "hare-lip."

In the Ungulata, the absence of developed cuspids in many of the families of this order is partially compensated for by the peculiar arrangement of the six incisors, while the corners of the mouth are so far back that the angular muscles are partially inactive. Yet the arrangement is plainly observable in the characteristic expression, this order being, except in the case of certain sub orders, timid and fearful. The presence or absence of the cuspid changes the whole expression, and the horse, which has canine teeth, may by close and experienced observers be distinguished from the mare, which has none. But this study, although intensely interesting, is foreign to the objects of this paper, and I will not enlarge upon it. I could not, however, resist the impulse to advert to it.

I should be glad also to take up at greater length the question of functional anatomy, but time forbids. I can but superficially present my subject at best. As much time should be spent with each of the muscles whose action is in any way connected with that of the orbicularis oris, if we would thoroughly comprehend the matter. The dentist who constructs artificial teeth has in his keeping the making or marring of the whole human face. If he is not an anatomist, and if at the same time he has no artistic ideas, and if he does not as carefully as the sculptor study the face which he is endeavoring to idealize, he is unworthy a place among artistic dentists. When one sees the perverted, distorted, deformed features of some one who might have a pleasant expression; when children, perhaps, look upon a mother from whose hallowed image all the sweetness, and love, and patience, and tenderness have been eliminated by the cursed work of some pretender to knowledge of which he is in utter ignorance; when we reflect upon the blasted lives of young women whose future perhaps is wrecked through their being made repulsive to one who should have been attracted; when we observe upon the streets, in society, at home and abroad, the horrible caricatures of the human face divine that are the result of the reprehensible ignorance of pretended dentists, one wonders whether after all our profession as a whole brings more of good than evil upon mankind. When we think of what it might be, and of what it is, we are led to weep at the present status of the art of dentistry, and are consoled only by the remembrance that amid all the Cheap Johns who are violently struggling for a bare existence there are a few who do honor to their profession by conscientious and intelligent work, and who are rewarded, as such men always are, not only with the plaudits of a judicious world, but by the more substantial benefits of well-paid labors.

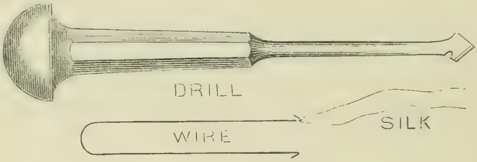
THE TREATMENT OF TWO CASES OF FRACTURE OF THE INFERIOR MAXILLA, BY WIRING.

BY STEWART L. MCCURDY, A.M., M.D., PITTSBURG, PA.

DISREGARDING the various excellent appliances used in the treatment of fracture of the inferior maxilla, I desire to report two cases in which wiring was practiced and record results, which are all that could be desired.

In order that wiring of bone may be speedily done, it is necessary to use a notched drill, as shown in Fig. 1. It is an easy matter to pass a drill through a bone, but it is not such an easy matter to keep the drill hole pervious or to re-enter after the drill has once been withdrawn.

FIG. 1.



As will be observed, the drill is notched near the point. After it passes through the bone, a silk thread is thrown around the point and allowed to engage in the notch, when it is withdrawn. The drill hole once loaded with silk, the wire is attached to either end and drawn through.

In case of a fracture of the inferior maxilla, the drill is passed through the bone from without into the sublingual cavity. The thread is then drawn from within outward. To the internal end the wire is attached and also drawn outward. The wire is passed through the second drill hole in the same manner,—*i.e.*, from within outward.

The details of operative procedure given in the report of the following cases will more fully describe the technique :

Case 1.—J. Shaw, aged three years, seen in consultation with Dr. Helmes, had been kicked in the face by a horse, producing a compound oblique fracture of the inferior maxilla. The fracture extended on the right externally from the cuspid to the first molar, back of and along the sockets of the four teeth. The teeth were so loose as to prevent the fragments from being secured and held in position by the use of silk thrown over them. Every means at the command of the attendants, as well as a dentist who had been called in to assist, which included the usual external splints and bandaging, a dental vulcanite splint, etc., had been used to hold the fragments in position.

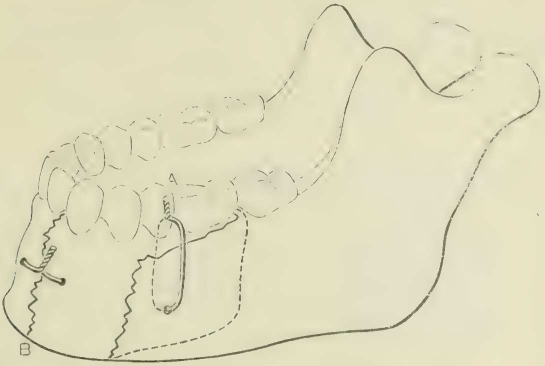
I first saw the case on the ninth day after the fracture, at which time the fragment was tilted up to the left at least half an inch. I decided to wire. To secure solid bone through which to pass the wire on the right, it was necessary to drill through the bone below and between the roots of the lateral incisor and cuspid. The drill passed through the bone into the sublingual cavity, around which a loop of silk was thrown. The drill, now loaded with the thread, was withdrawn.

While the fracture extended to the second right molar, it was superficial enough not to loosen the tooth and destroy its power to support the wire, as were the teeth above mentioned.

The ends of the wire were brought together external to the first incisor, and twisted until the bones were brought into perfect apposition and the teeth on a plane. The ends of the wire were bent upward between the teeth and cut off just below the crown, which placed it out of the way of injuring the mucous membrane of the mouth. From this time on there was not a particle of trouble with the case. In about six weeks the wire was removed, with a perfect result.

Case 2.—J. B., aged sixteen years, was helping to coal up an engine at a coal tipple. His head was caught between the apron and the side beam of the tipple. He sustained, besides numerous contusions, a laceration of the left ear and left side of the face, and two fractures of the inferior maxilla (see Fig. 2).

FIG. 2.



I saw the case on the eleventh day, and, as the physicians in charge had done everything ordinarily done to hold these fractures in position, to no purpose, I decided to wire. This was done as shown in Fig. 2. The fracture was quite oblique, and one drill hole was sufficient to include both fragments. The wire was thrown over the alveolar process and twisted in the other fracture (Fig. 2, a).

The other break was at right angle with the long axis of the bone, and two drill holes were necessary (see Fig. 2, b). The ends of the wire were twisted so as to completely approximate the fragments. The twisted ends were turned up and clipped off a little below the teeth. The result in this case was perfect in both fractures. The wires were removed in two months.

It is not uncommon, after the use of nails and wire for the adjustment of fractures, for small fragments of bone to be thrown off about the drill holes. In neither of these cases did this occur.

◆

CORRESPONDENCE.

THE QUESTION OF TEMPERAMENTS.

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—In examining Dr. Thompson's admirable paper in the DENTAL COSMOS for August, 1896, I note after a search through the works of the author quoted by Dr. Thompson what appears to be an error, which may be misleading to those who might be induced to examine the literature quoted. Dr. Thompson (page 632, COSMOS) speaks of the temperaments being first systematically grouped by Herodotus. Upon noting this, I consulted the works of Herodotus to find this item, which for a dentist not to have discovered upon his first reading would be an inexcusable oversight. I am unable to find the reference !

Dr. Thompson must have intended referring to Hippocrates, who is generally accredited with the first systematic and recorded observation in this field. It would be strange indeed for contemporaries, as Herodotus and Hippocrates were, whose fields of observation were in entirely different directions, to have both written upon this subject, and but one, Hippocrates, to be the only one quoted by writers in this particular. This is still further emphasized by the difficulty of procuring satisfactory copies or even translations of the works of Hippocrates. Of Latin translations there are several ; the only respectable English or American volume I have ever found is but an epitome. The reference to temperaments will be found in Section III—Nature of Man.

Apropos of the same writer and our mutual calling, this Æsclepiadæ has an admirable short chapter on dentition. The medical references in Herodotus are mainly in his Euterpe, which contains no reference to temperaments. Translations of this author are complete and accurate, so such a subject would be readily found.

It is possible that Herodicus, a master of Hippocrates, may have been a writer upon this subject, but there appears to be none of his writings, if he wrote at all, which have come down to us.

The subject of the essay under comment is of exceeding interest, occupying, as it does, the border-land which touches science upon one hand and pseudo-science upon the other. An examination of the great bulk of the literature dealing with this matter belongs to the latter category, and but little of it to the former. Curiously enough, the major part of the literature of this subject appears to be inextricably bound up in the typical pseudo-science, phrenology, and its usual accompaniment, physiognomy. Be it understood, though, I am referring to the phrenology of Gall and the physiognomy of Della Porta and Lavater, not to the scientific representative of the former, cerebral localization, nor to the demonstrable aspect of the latter, as observed by Darwin and expounded by Mantegazza, nor to the connecting links between the first and second classes, the works of Lombroso and Nordau.

It is unfortunate that this aspect of the "Constitution of Man" is not studied as Combe would, no doubt, have studied it, were he a contemporary. As a matter of fact, Dr. Thompson's treatment of the subject is the most rational we have yet had The field is a broad one, which has had a few stumps extracted, but has never been ploughed. Some day in the dim future the medical fraternity will awake to a realization of its importance in its bearings upon pathology and therapeutics, both physical and psychical, and we shall have another "revolution in physic." It has struck me that the present method of designating temperaments is susceptible of improvement ; for example, assume for the nonce that we accept what are called the basal temperaments as actual qualities and quantities. An individual's temperament is stated to be sanguo-bilio-nervous ; why not adopt the method of the mathematician and represent this after the manner of a formula ? The basal temperament is divided by, lessened by, the sum of the modifying elements. Let us, then, represent the basal temperament of the individual as the numerator of a fraction, its denominator to be the sum of the modifying temperaments, after the manner of

$$\frac{a}{b+c}$$

which would make our example

$$\frac{\text{Nervous}}{\text{Bilious}+\text{Sanguine}.}$$

Did the temperament happen to be lymphatico-nervo-sanguine, write it

$$\frac{\text{Sanguine}}{\text{Lymphatic}+\text{Nervous}.}$$

It would be an interesting work to present this question of temperaments to some of our most distinguished and scientific medical clinicians, if they could be made seriously interested, and see what they evolve from it, and how far the present deductions of the writings upon the subject are borne out by their observations.

As far as present evidence is concerned, I never could find but forty per cent. science and sixty per cent. pseudo-science in the matter.

Henry H. Burchard.

◆

PROCEEDINGS OF SOCIETIES.

UNION MEETING OF THE MARYLAND STATE DENTAL ASSOCIATION AND THE WASHINGTON CITY DENTAL SOCIETY.

(Concluded from page 783.)

Second Day—*Afternoon Session.*

The convention was called to order at 3.30, and Dr. G. H. Claude read a paper, of which an abstract follows :

Pathology and Therapeutics of Dead Teeth.

The author defined a tooth as dead when the pulp had been devitalized. Respecting the morbid anatomy of such cases, he said,—

When a pulp dies, the pericementum—that portion of the periosteum at the root apex, reflected upon the root from that lining the alveolus—becomes congested, and, unless early interference is had, suppuration supervenes. First, the pericementum becomes distended and partially detached from the root, pus generates in the sac thus formed, and becomes a foreign element which must be thrown off, and, if influenced by gravity only, would discharge by the shortest route ; but it is directed therefrom by the anatomical structure of the environments. Pus once formed and the periosteal sac containing it broken, it must then find its way through the bony structure until it reaches the periosteum covering the outside of the maxilla, when it becomes again arrested by this tough, elastic membrane, causing much distention and inflammation of the surrounding tissues. The pressure of the constantly increasing generation of gas from decomposition of the pulp and pus-secretion from the sac thus formed causes a thinning of the soft structures until an opening is established, when the trouble subsides in a few days, leaving a permanent fistula unless interfered with.

Whatever the treatment,—extraction, which is seldom necessary, or cure by other means,—morbid changes have already taken place which will remain through life. The periosteum becomes thickened, the cementum nodular, if inflammation has preceded the death of the pulp, and the bony structure has become somewhat thickened.*

The color of a tooth is not altered by the death of the pulp if the débris is all removed and it is properly filled before the discoloration takes place. It remains a useful and ornamental part of the human organism, and if anything it is more adherent and firmly fixed in its socket than if the pulp were alive.

The most prominent symptom of the partial death or approaching death of the pulp is a not well-localized, intense pain on the affected side of the jaw, described often as neuralgia, the pain intermittent in character, sometimes described as thumping or hammering, increased in intensity when in the reclining position.

It is often difficult to determine in the early stages the tooth thus affected, and most frequently the pain is described by the patient to be in some other tooth than the one causing the trouble. I was called to see a patient a short time since who had a dentist to extract the upper second bicuspid, which was perfectly sound, only to get a few moments' relief, probably from loss of blood. Shortly afterward the attack returned with renewed violence. He sent for his physician, and was laid up in bed, only resting moments at a time while under the influence of anodynes. After being under anodyne and tonic treatment for three days, he sent for me. Upon examination, I could see no fillings or cavities in his teeth. The upper right lateral incisor appeared a little dull in color, and had a slight fracture of enamel near the cutting-edge. A year previous to this I had examined his teeth, and he reminded me that then I had told him it looked like a dead tooth. On feeling in the roof of his mouth just above the root of this tooth, I found it exquisitely sensitive to pressure, and detected some distention, softening, and fluctuation. I brought my dental engine to his house and drilled through the palatal surface into the pulp-canal, and pus flowed freely through the openings. His relief was immediate. After two weeks, when the discharge had ceased, I filled the root, with no subsequent trouble. This pulp was devitalized by a blow when he was a child, and, judging from the size of the apical foramen, before the tooth was thoroughly developed.

Cases of this sort are of too frequent occurrence where good teeth are extracted on the demand of the patient, without the dentist using proper discrimination.

When in doubt a delay of a few days or hours may establish beyond peradventure the diagnosis, and teeth may be saved which otherwise are ruthlessly extracted. Patients will nearly always consent to put up with the suffering for a time if alleviated by remedies. A careful examination will always raise a suspicion of the offending tooth, and often settle the diagnosis from the pain on percussion, looseness, insensibility at cervical margin, and response sometimes to heat and cold. A partially dead pulp will respond to heat and cold even more actively than a tooth in a normal condition. There may be no pain on cold being applied, but the pain will be intensified by the application of heat. This is a very important point in a discriminating diagnosis.

---

* See DENTAL COSMOS, No. 1, page 33, 1896.

The pulp once dead, the cavity should be made large enough to afford access to all of the roots, and they should be cleaned out thoroughly to the apex, disinfected, and filled.

His method of filling the pulp-canal is that described by Dr. N. S. Shields, filling with gold or other substance that will not absorb moisture.

Discussion.

Dr. L. ASHLEY FAUGHT was always sorry to hear these teeth called dead teeth. They are pulpless teeth, but in a state of semi-vitality; they are not dead.

Dr. W. A. MONTELL asked Dr. Faught if he would describe a tooth as pulpless when it contained a putrescent pulp.

Dr. FAUGHT said what we describe as the pulp of a tooth is a vital organ; when it is putrescent it is not the pulp.

Dr. T. S. WATERS spoke of the value of an electric lamp in diagnosing a dead pulp. When the light is made to pass through a tooth with a dead pulp, the tooth will appear opaque; if the pulp is alive, it will be clear. Reflecting light from a mirror outside the mouth upon a mirror inside and from this back through the tooth, will answer almost as well as an electric lamp for the purpose.

Subject passed, and Dr. H. B. NOBLE read the report of the Committee on Dental Legislation.

The report was accepted, after which Dr. RICHARD GRADY read a paper entitled "A History of Maryland's New Dental Law." *

Dr. GRADY said that among the difficulties experienced in getting this new law passed was a protest from dentists residing in the state. Their chief objection was that the law restricted certificates of the examining board to graduates of dentistry. Dr. Grady himself thought that this was wrong, as it should make no difference how or where a man acquires the education; if it is such that he can pass the examination he should be granted a certificate to practice. He also thought it would have been better if all graduates of the schools had to pass the examination; but this was not agreed to. He felt that the board of examiners could do a great deal of good in preventing the students from practicing while at college. The board should say to the colleges, "If we call your attention to students practicing in their rooms, you should notify such students that they will not be graduated, as a law-breaker cannot be considered as of good moral character."

There are three exceptions to those who are forbidden to practice without the certificate granted under this law: First, physicians and surgeons; second, dentists holding certificates duly issued to them prior to the passage of this law; and third, dental students. But students have no chance to practice in a dental office, but only in the infirmary under the immediate supervision of their instructors.

---

* The full text of the new dental law of Maryland is printed under "Dental Legislation," in this issue.

Dr. A. W. Sweeny, of Washington, D. C., read the following paper:

Dental Legislation.

Two years ago the writer had the pleasure of reading a paper at the first of these union meetings, in the concluding paragraph of which he assured the profession that in dental legislation they have by no means a dead issue or an exhausted subject; and a review of the published proceedings of a number of the most important meetings held since then must furnish ample justification for that statement.

The claim has been advanced by some that whatever improvement has been observed in the thoroughness and efficiency of the work of the colleges has been due, in very large measure, to the stimulus supplied by the requirements of the boards of examiners, that the graduates of the last few years show a marked superiority, as a rule, over those of some years earlier, and that this most desirable state of affairs is a direct outgrowth of the laws; but this claim has been vehemently opposed by many, who insist that the colleges have always striven to furnish better and better instruction, and that whatever success they may have lately attained to in that direction has not been due to any influence of the laws, but has been brought about by the general desire for an advance toward higher education.

As is always the case in such controversies, the truth will be found to lie somewhere between the two extremes. For the champions of the dental laws to claim that to those measures must be credited almost all of the later improvement in dental teaching, or in the industry and application of the students, is nothing more than mere unwarranted assumption; while, on the other hand, to assert that the possibility of an examination by a board of examiners has never served to incite both college faculties and students to greater efforts, in some instances at least, must appear equally idle. All advances and improvements in moral and intellectual activity are the result of a combination of forces, consequently undue prominence must not be claimed for one alone. As the writer is already on record to the effect that, in his judgment, the colleges have been the most potent of all the influences which have served to advance dentistry to whatever of dignity it may claim as a profession, it would be in exceedingly bad taste for him to recede from that position now, and he has not the least idea of doing so; but that high regard for the colleges by no means obscures the very obvious fact that there have been, and doubtless still are, certain particulars in which the work of even the best of them might be called faulty. Unfortunately, conditions are not now what they were when the pioneer college was established. The men who founded that institution did not work for present gain or glory, and hence, though their methods may have been crude and their resources very limited, they were animated by a high resolve, namely, to raise their humble calling to a position of dignity and respectability by furnishing systematic teaching and thus extending its sphere of usefulness. Later, as colleges and students multiplied, the potent influence of "the almighty dollar," both through the channel of tuition fees and the prestige attaching to a professorship, asserted itself, and, for a considerable period, the average standard of attainment of the graduates sent out was not what those who have the welfare of dentistry at heart desired ; and that the dental laws may have had some influence in stimulating, even enforcing, some improvement is so exceedingly probable as to be very readily accepted as a fact by many. Certain it is that those who control the colleges should never lose sight of the fact that they cannot sacrifice the interests of the profession and the public to their own desire for profit by accepting and graduating improperly qualified students, without receiving condemnation. The colleges should ever be, in the already-quoted words of Dr. Holly Smith, "the bulwark and defense of dental education."

Throughout the discussion lately noted on the subject of dental legislation, almost all the effort has been expended in the direction of estimating the effect of the laws in securing a higher standard of qualification among practitioners, that is, the young men entering the profession ; for, apart from them and the few who may move from one place to another, the laws are, so far, of no effect. As the author of the statement that the public of no community had ever asked to have such laws enacted, the writer will now call attention to a few phases of the case as it affects the "dear public," which do not seem to receive a due share of notice. Assuming that all such laws claim, on their faces, to be designed for the protection of the said "dear public," as is the case here, it is but reasonable to endeavor to ascertain what degree of protection against injurious practices they accomplish. Let us even concede that they have done more than some will admit, and have compelled the colleges to turn out better educated and trained graduates. Then let us select some state where the law is most exclusive against all save those who come armed with a diploma and submit to an examination, and see if we can discover wherein the *dear public* has derived any *real substantial benefit* whatever.

A speaker at the last meeting of the American Dental Association complained that even intelligent people would patronize the advertising quacks, and said that years of effort to improve that condition of affairs had proven unavailing ; and yet, until the proper effort shall have been made and *crowned with success*, dental legislation will remain a failure in its most vital part. While it is unquestionably true that without a certain amount of education no one is fit to practice dentistry (and the standard established is not yet high enough), it is also equally true that a person may pass ever so satisfactory an examination and yet become a most discreditable and injurious practitioner ; and until some adequate provision is made to meet such cases, the true function of dental legislation will not be fulfilled. Hence it is that though a new dental law is reported almost every month, each community of dentists is constantly looking forward to a still newer one. As a case in point, note the latest amended law of the state of New York. It will be found in full in the DENTAL COSMOS for July, 1895. A general criticism of this law would be to cite its immensely amplified verbiage, reminding one of the words of Lord Coke, "overladen with provisos and conditions." Laws should be expressed as plainly and concisely as possible, so as to avoid opportunities for the discovery of "perplexed questions, niceties, intricacies, and delays."

While the law in question contains some good points, it also contains glaring defects, as are pointed out editorially in the same issue of the Cosmos, and with all its unwieldy bulk it makes but a feeble effort to reach beyond the one step of providing for an examination to determine fitness.

When persons other than lawyers undertake to secure the enactment of laws affecting the practice of a profession, it would seem, most certainly, to be sound policy to study such measures as the legal profession has adopted to regulate their own affairs. It would be easy to learn that they have certain rules which apply to the admission of candidates to practice; certain other (and most reasonable) rules for those who move from one place to another after having commenced practice, and again other, and most effective, rules which regulate the professional conduct of every practitioner, wherever he may be and throughout all the period of his practice; and while it is true that much rascality is perpetrated under the cloak of the law which goes unpunished, the restrictions imposed upon unprofessional practices are most salutary, and if similar provisions were incorporated into the dental laws, an early and most gratifying improvement would be noted. The writer will hazard the prediction now that the ultimate solution of the perplexities involving the subject of dental legislation will be indefinitely postponed, so long as attention is confined to the one line of effort and of argument which we see so constantly employed. The situation demands something more than effective teaching in the colleges and rigid examinations by the boards. The teachers are ahead, that is, the best of them, and they will stay ahead in point of ability to teach and examine students; and, whether it may be generally admitted or not, the examiners are in reality "the policemen to enforce the law," as pointed out by Dr. Smith, and the sooner they come to a full realization of the fact that they can best discharge their duties by aiming to become useful and competent guardians of the public welfare, acting under efficient and wisely-framed laws fitted to promote that end, the better it will be for all. All that the law need concern itself with about the colleges is to see to it that they furnish the best possible instruction, fully up to the demands of the times. This accomplished, and the license to practice once obtained, it should be good, *when properly authenticated*, all over the United States. Time spent in the discussion of questions of state rights, and "leveling upward and downward," and the necessity for so much higher standard of acquirement in one place than in another, is all worse than wasted. The statement made by Dr. Palmer, of New York, before the New Jersey Society in 1894, that it "is all folly" to maintain that a man whose reputation for skill and high professional standing is world-wide must be compelled to submit to an examination before being allowed to commence practice in certain states, is absolutely and unquestionably correct. It is the rankest kind of folly, and its evil effect is not confined to the individual state which adopts it.

Because effort has been wasted in devising such legal absurdities, which are so bound about with "red tape" as to be hampered in the direction of their chief usefulness, dental legislation has failed to attain to its true end and aim ; and hence it is that complaint is made that, despite years of effort at law-making, the public, even some of the intelligent public, cannot distinguish the reputable practitioner from the quack ; and hence the constant outcry for "a new dental law."

Provide new laws by all means, and let them be so framed that they may be found worthy to survive and grow old. Set up effective protection about the *entrances* as well as the exits of our colleges, to the end that the worthy ones may flourish and the unworthy perish, but do away with that "folly" which refuses in one state recognition to the degree and certificate granted in another. Allow, at least, to the examiners (who *should not* be appointed through political influence) some discretion with regard to holding examinations in the case of those who hold certificates granted in other states, so that if they have good reason to deem such a step necessary it may be taken, if not, omitted ; and be always particular to see that the examiners themselves are competent to exercise discretion wisely. Having accomplished that much, do not for a moment suppose that the law is about complete. The ground will then be staked and the lines set, perhaps a little of the foundation on which the law must rest will be laid, but nothing more. While it has been often, and truly, said that the college can only prepare its students to begin practice and send them out, the law should, and can be made to, look to them ever after, and in doing that it will fulfill its mission to the public. It might be well, after the student has been graduated, to issue a certificate admitting him to practice for a certain time,—a term of probation,—to be made permanent, without cost, at the expiration of the time, upon satisfactory demonstration that during that interval the holder has not practiced dishonestly ; and when a practitioner removes from one place to another, proper credentials setting forth the same fact are of vastly more practical value than any examination that can possibly be devised.

The grand object of all dental laws should be to clearly define the line which separates the honest practitioners from the quacks, and to protect the public, as far as possible, against the ravages of the latter ; and while it is repugnant to the spirit of the common law to confer arbitrary powers on a few men, so that they may, at any time, deprive a citizen of the right to continue his business by "star chamber" and summary methods, a law can be framed which will confer power to check the wholesale and unblushing malpractice which is carried on every day, in every city in the land, by the same means through which all other nefarious practices are held in check. Provide a law which will describe, in plain, intelligible terms, some of the forms of malpractice which are perpetrated on the public every day, with the ordinary measures for conviction and punishment, and let the punishment be not only fine and imprisonment, but the revocation of license to practice, which would extend to every state requiring a certificate of transfer. Let that be done, and the complaint that the intelligent public cannot discriminate between the honest practitioner and the quack will cease, for a sentiment will be created in the public mind which dental legislation has not yet been able to awaken.

Let the public see that the law is aimed at the quack, not because he advertises to work for small fees, but because he advertises *lies*, and because his intention is to deceive them and to take their money for services that *are not* cheaply rendered at the price, but *excessively dear*, often far worse than worthless.

With such a law, which would be worthy of the name, the objectionable features of dental legislation would disappear; all honest, well-meaning practitioners could give it hearty support, and those who opposed it would be branded at once. The dental societies could take up the work of disseminating information for the purpose of educating the public to shun the charlatans with an assurance of the most gratifying success, because the "dear public" would at last realize that the effort was not inspired by self-interest.

Such is the outline, vague though it may be, of the law which the writer hopes to see enacted. It has been the hope of seeing this which has inspired him throughout whatever he may have written hitherto upon this subject, and it was the forecast of the blessings which such a law could be made to confer, alike upon the public and the profession, which moved him to address to you two years ago these words: "Properly cared for, it will grow into an object of beauty, which will shelter the public from much imposition, and cause the profession joy and pride in the youngest of its offspring."

There was no discussion of this paper, and Dr. M. H. Cryer gave an exhibition of some of the possibilities of the surgical engine, after which the convention adjourned.

SOUTHERN DENTAL ASSOCIATION.

The twenty-seventh annual meeting of the Southern Dental Association was held at Asheville, N. C., July 28, 29, 30, 1896.

The meeting was called to order by the president, Dr. Jno. S. Thompson, Atlanta, Ga. After a prayer offered by Dr. H. F. Chreitzberg, an address of welcome was made by Mr. Lawrence P. McLoud.

The president then read his annual address, in which he gave a résumé of the history of the association from its origin, in 1869, up to the present time. A letter from Dr. W. H. H. Thackston, of Farmville, Va., bearing upon the early history of the association, was read as an incidental part of the address. The question of a union of the Southern Dental and American Dental Associations to form a National Association was favorably commented upon.

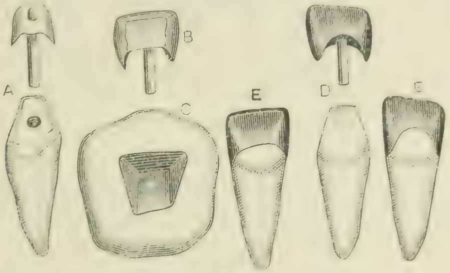
The Committee on Prosthetic Dentistry reported a paper by Dr. C. L. Alexander, of which an abstract follows:

Casting Fillings and Abutments for Bridges.

The world of men will not long put up with a man in his profession who cannot rid them of their infirmities.

The demand is made on the dental profession for a more perfect method of constructing artificial teeth. The idea now being developed by Drs. Bonwill, Walker, and others will help us to meet the requirements of nature in this direction. The demand was made that hurtful drugs be used in such way as not to injure either person or teeth, and that pain be not experienced from their use in extracting pulps, preparing cavities, etc. Cataphoresis is the answer that science has made to this demand, and it meets perfectly the requirements. The demand is likewise made for a successful method of dealing with a class of teeth that cannot be satisfactorily treated with the old method of filling and crowning.

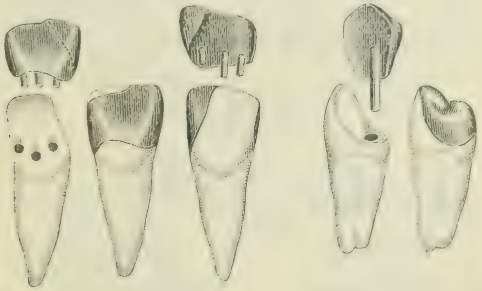
FIG. 1.



Showing details of the process for making cast filling for incisor. A, Post with plate adapted; B, Restored contour in wax; C, The contour invested; D, Cast contour detached; E, E, The finished restoration.

It is my pleasure to-day to call your attention to a new method by which it is possible to perform an ideal class of work. As to its classification, you will have to decide whether it comes under the head of operative or prosthetic dentistry. So far as I have been able to learn, the idea presents a new field for the consideration and investigation of the progressive dentist.

FIG. 2.

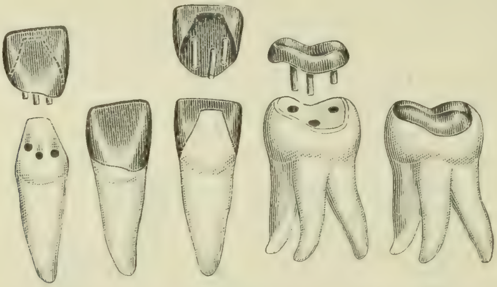


Restoration of incisor by cast filling.

Restoration of molar by cast filling.

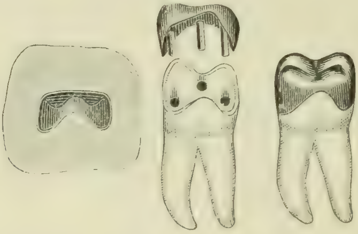
The fundamental principle is an old one, that of fusing and flowing metal over platinum sheet or foil. My method consists in detail of burnishing platinum over the surface to be restored; the holes for retaining posts having already been made, can easily be located and the posts adjusted therein. Then, by heating a little modeling composition over a spirit lamp and pressing it firmly down over the surface and allowing it to cool, we can remove the platinum sheet and posts in correct relation to each other. We now invest and solder the posts with pure gold. The piece is again placed upon the tooth in the mouth, and, after carefully trimming and reburnishing, an impression is taken, and, when an occlusion is needed, it is made at the same time by the patient closing the teeth together before the impression material has become hard. The metal foundation will be drawn out by the impression compound when it is removed from the mouth. Each side of the impression thus secured is filled with any good investing material and placed in an articulator. After heating and removing the impression material, you can restore the contour of the tooth by building up with wax. Over the wax surface thus formed we burnish gold or platinum foil; if the former, it should be

FIG. 3.



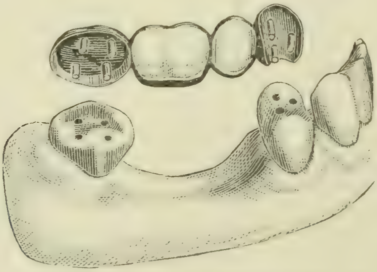
Front and back view of an incisor restoration, and cast filling for molar.

FIG. 4.



Foil matrix invested. Cast filling for molar.

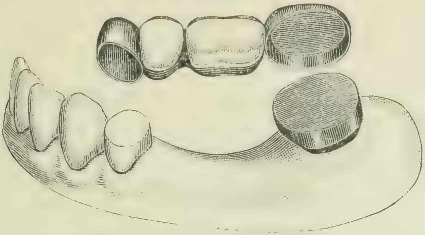
FIG. 5.



Method of bridging with inclined abutment.

very heavy, say No. 60. A suitable portion of the wax being left uncovered, the work is cut away from the model and invested, with the exception of that part of the wax left uncovered by the metal. Through this opening all the wax is boiled out, leaving a matrix lined with metal, which acts as a carrier for the metal which is placed and fused within. I usually use 20 or 22 carat gold solder for this purpose. When pure gold is used, of course, the matrix must be lined with platinum throughout. When removed from the investment, the casting is finished and cemented to its position on the tooth, and then given a final finish. In bicuspids and molars, I frequently find it more convenient to stamp up the cusps, using pure gold, 35 gauge, for this purpose, as it can readily be made to conform to the grinding-surface of the occluding tooth.

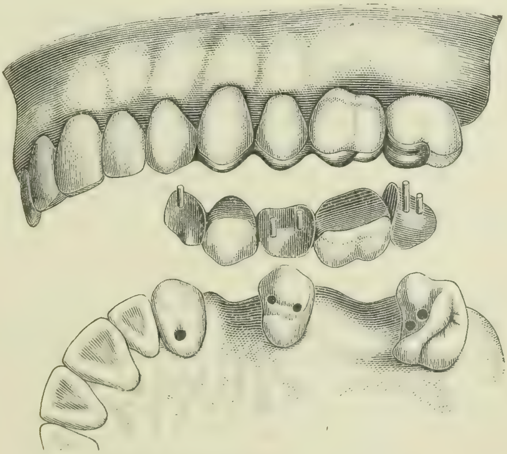
Fig. 6.



Usual method of bridging with inclined molar abutment.

Abutments for bridges (see Figs. 5 and 6) are practically made in the same way as the cast fillings, and when finished they are placed in position upon the teeth and a model secured, from which the bridge is made in the usual way. The abutments of a bridge should be made of a higher fusing metal than the bridge proper.

Fig. 7.



Bridge with cast filling abutments.

In bridge-work the advantage gained by using the cast abutments is so evident, I feel it is only necessary for me to say that by the use of this system tooth-structure is saved in all cases, you avoid a display of gold from the labial aspect, secure a light and substantial piece of work, free from overhanging margins, which provide a lodging-place for food-substance, a bed for the development of bacteria, which eventually brings disaster to the bridge, defeating the very object we had hoped to gain.

By the application of this method, bridging inclining teeth (see molar in Fig. 5), even when the incline amounts to a deformity, becomes an easy matter, the operator having only to be careful to drill the retaining holes for the bridge posts parallel with each other.

In my opinion, which has been based upon a limited experience, the work will fill a long felt need. In operative dentistry many cases are presented where it is almost an impossibility to restore the lost part of a tooth by the old and accepted methods of filling.

We can easily extricate ourselves from this embarrassment by constructing metal castings for these special cases, and it is for these extreme abnormalities that I recommend this class of work, and insist that it must be adopted or the profession stand the odium of being unable to meet the demand made upon it or of being unfaithful to those who have placed their teeth in its care. What I have been saying may savor of egotism, but it is that egotism born of the success of actual experiment, and is based on that positiveness that correct scientific principles warrant.

You must not expect to get perfect results from the beginning; it will require time and careful manipulation to make a success of it. Your trained hand will soon grasp the situation, and you will be able to accomplish in an artistic and beautiful manner results which will be surprising, and in one-half the time required by the old methods. So far, the chief objection urged against the cast work is the possibility of the cement not standing. In refutation of this objection, I can only say that the adaptation of the casting to the walls of the tooth, when made properly, is so perfect, it is hardly probable that we will meet with any trouble in this direction.

I am at work now on cements, and am meeting with some encouragement, and hope to succeed in making a cement which will be insoluble to such an extent as to stand the reaction of the fluids of the oral cavity.

Discussion.

Dr. A. P. JOHNSTON, Anderson, S. C. I have not had much experience in this kind of work, but it does not look to me as if work of this kind, upon the inclined molars described (see Fig. 5), would stand the test of actual service. And there is no cement now on the market that will hold this kind of work ten years. I confess that I do not see the advantage over so shaping the walls of the abutment tooth as to slip a band over it for the bridge abutment. I cannot see how one could get sufficient hold in this work to secure such a bridge as is shown (see Figs. 5 and 6). I do not see how you can drill all these little holes and not set up irritation of the pulp. To me it seems that it would be exceedingly difficult to make such a piece to my own satisfaction, and even then I should not expect it to last. For restoring incisors, however (see Fig. 1), it seems to be a splendid idea, and I shall try it there when opportunity offers ; but for the more extensive cases I do not think the cement has yet been made that will stand such service.

Dr. G. J. Friedrichs, New Orleans. When this work can be successfully accomplished, it is far preferable to an all-gold surface. Cement, both oxychlorid and oxyphosphate, is one of the greatest blessings to the human race, and especially to the dentist. Where would be the bridge-work of to-day but for cement? Forty-four years ago we fastened crowns on with wooden pins! The work here represented is artistic and practical in its results. The only trouble will be to avoid showing too much gold, but in any case it is better than an all-gold covering, which is an abomination.

Dr. S. W. Foster, Atlanta, Ga. I have had considerable experience in making what I call "laboratory fillings." At the meeting at Old Point Comfort I read a short paper in which I described my method of making fillings very similar to these. I may say that I am an ardent advocate of this method of restoring contour. Dr. Alexander's method differs somewhat from mine, but it looks very plausible, and I do not see why it should not be a success. It all depends on getting a cement that will hold, when the restoration is extensive.

And if it answers for broken corners of incisors, why not for bicuspids and molars, as in Figs. 2 and 3? Also for restoration of lost tissue in cases of erosion and abrasion, and in building down teeth that have been worn away from too direct occlusion?

In the latter case the strain is too great upon contour fillings of cohesive gold, and here these cast fillings will prove the greatest boon. As to the duration of the cement, I have never had to replace but one through failure of the cement. The secret of success lies in rolling the platinum very thin, *between copper plates;* this takes away its elasticity, and you can get perfect margins. If Dr. Johnston will be a little careful in getting a perfect adaptation, these fillings will not come away. There will occasionally be a difficulty from lack of sufficient tooth-structure to drill the holes and not reach the pulp. It is necessary to have a thorough knowledge of tooth anatomy to secure proper anchorage and yet not endanger the pulp. Two years ago I described a case in which so large a portion of the tooth had been broken off that I feared it would be necessary to devitalize the pulp to fill in the ordinary way with cohesive gold, but that tooth is standing to-day with the laboratory filling as perfect as when I described it in the paper read at Old Point Comfort. This is really the only way in which to restore such a bicuspid unless the all-gold crown is used, and our esthetic patients don't want all-gold crowns. I must commend this character of work.

Dr. Alexander. There is, of course, a possibility of these fillings coming off, but I have been doing this work for some time, and have not had a single case of failure yet.

Dr. J. Y. Crawford, Nashville, Tenn. This class of work is about third in point of value; it ranks about third in point of strength of attachment. I like the system very well, however, and there is probably more in it than we would imagine; it is much stronger than one would think. The duration of cement is very variable, varying in different mouths In some mouths it dissolves and disintegrates much more rapidly than in others. I take issue on the idea of burnishing platinum for a matrix. I prefer 24-carat gold, particularly for a restoration of contour in 24-carat gold. I should use platinum as a matrix only for a porcelain inlay.

Dr. G. V. I. Brown, of Duluth, Minn., has something on this order, and for large restorations I prefer Dr. Brown's idea,—a gold inlay, he calls it. After the cavity is thoroughly prepared with flaring borders, he fills it one-third full of wax before taking the impression. In setting the inlay the wax is replaced with cement in which the pins of the inlay are set, making a very desirable operation, having a body of cement in the center of the tooth with pure gold over it. Our large contour fillings move slightly in the cavity as much as this work, fill with all the care you can. Our cohesive gold fillings nearly all leak, but they quit leaking after a while. There are no undercuts to hold these mechanical fillings, and using the minimum quantity of cement they easily get loose. But Dr. Brown increases the bulk of cement, and it is protected until it gets hard. With the single exception of this feature I approve of Dr. Alexander's method very much. I like his hoods (see Figs. 5 and 6). If you have a sound tooth you need not mutilate it as in putting on a gold crown, and it is especially desirable to avoid an all-gold crown in a lady's mouth. Often in making a piece you have to be very careful in trying it in the mouth if you have no guide pins, or it will not go in twice alike ; and there is the same difficulty in getting a collar on twice alike : you are very liable to change the occlusion. But the guide pins give perfect adaptation. But I would increase the cement in the bottom of the cavity, though not at the margin.

Dr. ALEXANDER. If you will examine my models you will find that I use quite a quantity of cement.

Dr. CRAWFORD. You can readily use three guide pins. I once thought the idea was original with myself. In one case in which a gentleman was wearing an old-style gold plate with clasps, I suggested four hoods, two on the cuspids and two on molars, as liable to cause less injury. Two weeks later Dr. Marshall was in Nashville, and I showed him a case in which I had utilized a sound cuspid. When he returned to Chicago he called on a friend and found him making a hood. He said he had been using them for some time. I congratulated him upon his good judgment. There is no deficiency in strength of attachment, but that which arises from the susceptibility of the cement to the fluids of some mouths. It is not necessary to use very long pins. In bicuspids you can locate them in the cusps. In second molars, if the neck is constricted and the gums healthy, it is not necessary to put on a collar close down to or under the gum.

Dr. ALEXANDER. I would like you to examine these models and see if it would be possible for the cement to wash out with such a close fit.

Dr. CRAWFORD (after examination). It is possible, but not probable.

Dr. C. E. KELLS, New Orleans. I will not tell you how crowns were made forty years ago, but I do not advise bridge-work ; there are too many failures. It may be due to climatic effect, but people from other parts of the country where the climate is not so desirable come to us with bridges that are loose ; they will say that when it was put on they did not think it ever could get loose. But I reply, "If your own teeth did not last, how could you expect a bridge to last?" Where I make one, I refuse to make forty-nine. (Dr. CRAWFORD: Then you make forty-seven mistakes!) I am partially a convert to Dr. Parmly Brown's porcelain bridge-work; it is perhaps not so strong as gold, but it is so much nicer. In the cases shown by Dr. Alexander (Figs. 5 and 6) I should put in a porcelain bridge anchored in fillings, though I have never had such splendid results as we have seen figured in the COSMOS.

I anchor a porcelain bridge in gold fillings, if possible; if not, I do the best I can. As for cast fillings,—why, we often find cases where we cannot keep the cavity dry enough for a gold filling. In such cases line the cavity with platinum and make a cast filling. I recently saw one that is now five years old. I could not keep that cavity dry enough to put in a gold filling. The weak spot is the cement. It may be the effect of our climate, but loose bridges come to us from all over the country, and I never advise one. Bridges inserted by incompetent dentists have done more harm than good dentists can repair in forty years.

Dr. A. P. JOHNSTON, Anderson, S. C. In order to get a perfect adaptation, the cement must be very thin and of a quality that takes a long time to harden. If it hardens quickly it is no good. A slow-setting cement, mixed very thin, will permit of perfect adaptation.

Dr. CRAWFORD related the case of a patient of his, a lady seventy-eight years old, for whom he did an extensive piece of bridge-work. He hesitated at first to perform the operation because of the age and physical condition of the patient, and the unavoidable strain upon her which the performance of the work would entail. The work was, however, satisfactorily performed, and Dr. Crawford felt that he had added some years to the life of his patient by reason of the increased ability to properly masticate her food which the bridge-work had conferred upon her. Continuing, he said,—

In another case, sixty-three years of age, bridges enabled the patient to chew as she had not done for twenty years before. We should not quit because here and there we see failures. Twenty-eight years ago my upper lip swelled up to the end of my nose, and yet the stump of the offending tooth now carries four teeth with which I can bite corn off the cob. Seven dentists said it would not do, but one man knew better than that. The application of a bridge prolongs the usefulness of a tooth rather than injures it; it prolongs the longevity of a tooth. Dr. Kells, who says he refuses forty-nine out of every fifty cases proposed for bridge-work, has not yet grasped the full capabilities of this art. He spoke of bridges anchored in fillings, but when we remember how hard it is sometimes to make our plugs stay in even without any leverage, how can we expect them to bear the strain of supporting a bridge? The filling becomes the center of motion, and the bridge exerts a powerful leverage which we cannot expect any filling to resist.

Dr. R. A. RUSH, Selma, Ala. I am especially pleased with Dr. Alexander's method of filling that bicuspid (Fig. 2), if the tooth proves strong enough to bear it and cement will hold it. I had a case last week which would have been exactly suited for work of this kind. A solid gold crown is inartistic, especially in a lady's mouth;

it is difficult to make the band fit perfectly beneath the margin of the gum. I did not think that in that case I could make a success of a Richmond crown. I think Dr. Alexander's cast filling would have been just the thing for that case. In so many cases of approximal cavities in the bicuspids the entire cusp is liable to split off notwithstanding all our carefulness. But this cast filling, with its retaining pins, will greatly strengthen the tooth if only the cement will last.

Dr. R. K. LUCKIE, Holly Springs, Miss. What was the condition of the pulp in that bicuspid?

Dr. RUSH. The pulp was dead. The tooth had amalgam fillings in both approximal surfaces, and had split in two down to the alveolar process.

Dr. R. K. LUCKIE. I have been very much impressed by my study of Dr. Alexander's models, and especially with that bicuspid, because in the past few years I have had several such cases, the first bicuspid split in the bifurcation of the roots. We find them troublesome to crown with either the Richmond or the Logan crown, and the all-gold crown is very objectionable. We have difficulty also in crowning the lateral incisors because of the small, contracted neck. They are not so well adapted to porcelain fronts as the centrals or the cuspids. Four or five years ago, I had a friend who had about as good teeth as any of my patients. Unfortunately, in biting a piece of ice, he broke off the palatal cusp of the left superior bicuspid. The pulp was not quite exposed, but so nearly so that I thought it best to devitalize the pulp. I filled it with amalgam and made a good tooth of it. Two weeks later he broke the same tooth on the other side,—also a sound tooth,—and I treated it in the same way. But for those cases this cast filling, anchored in the root, would have been about as strong as an all-gold crown, and better because we can preserve the outer enamel face. In lateral incisors, where nothing is left but the labial wall, with a cast filling of this kind, anchored in the root, we would have a strong tooth. I do not see why the cement should get out any more than in setting a Logan crown. I had one case of a first bicuspid broken off below the gum, the root so short that I could use only a very short post. I had little confidence in it, and yet that tooth is good to-day. If you get a good cement and mix it properly, you can succeed; but there is an art in mixing cement, and we do not always get it just right. It is the same in mixing plaster,—our impressions are imperfect because we failed to mix the plaster just right; and it is so in mixing cement. I do not think it necessary to have it so very thin as Dr. Johnston has said. It should be of such consistence that it will go in easily, and yet not wash out readily.

Dr. H. E. BEACH, Clarksville, Tenn. There is only one point I propose to make, and that is in regard to abutment caps in bridge-work. I have seen so much bridge-work loosened from the unequal strain upon the abutments at the ends of the bridge. I have been surprised to see men who make such beautiful operations use so little discretion in the matter of direction of force, which should be on a direct line with the axes of the roots which serve as abutments. We should construct our bridges on the same principle as the engineer constructs his railroad bridges, which are destined to support heavy weights. His object in reaching from pier to pier is always to have the weight adjusted in a direct line perpendicular to the axis of his piers. So we should be careful to have the force of occlusion resisted in a direct line, with the axes of the roots serving as abutments; there would then be less trouble with loosened abutments and less complaint of poor cement. I want to make that point forcibly, —let the line of force lie in the direct line of the tooth of resistance.

Great stress has been laid on the strength of the cement, on the use of the proper kind of cement, etc., but you want to use common sense, practical judgment. Mix your cement stiff enough or as hard as you would use it for any other purpose, but do not have it too quick-setting. The Harvard cement sets slowly and gets very hard. You can make it as stiff as you like it, but use it squarely and gently and give time for it to go up; use pressure and force it up, press all the surplus out from under the band, and be sure that you have the band properly fitted at the cervical portion of the tooth.

Dr. A. P. JOHNSTON. Oxid of zinc and plaster of Paris, half and half, makes the best investment possible for crowns and small pieces of bridge-work.

Dr. J. Y. CRAWFORD. There are some present who are familiar with what I am about to say, but I will repeat it for the good there is in it.

I am one of those who believe that a man can practice dentistry, both operative dentistry and mechanical dentistry, and serve his patients better and get out of it all the good there is in it, if he will first deliberately question his judgment as to what is best to be done in each particular case. Do not drift into routine work, but study up each case as it presents.

Before you do anything (except for the immediate relief of pain), study the case well, to see which is best adapted of the various methods possible. In the same case one man would say, "certainly, save those teeth," but another might say, "remove them all." The great danger lies in specialism,—all of one kind. Too many good dentists are inclined to avoid mechanical dentistry. We do not care to come in competition with the cheap, no 'count mechanical dentist of the Cheap John class, and in that very way we throw the work into the hands of that class. We must do more work along that line ourselves, if we would cut him off. We must put a stop to that class of men who work only for the dollars and cents, and who pull out teeth indiscriminately because they do not know how to do anything else with them.

If dental surgery does nothing else than indoctrinate the medical world with a knowledge of the danger lying in the indiscriminate destruction of the human teeth, it will have accomplished a great work. I advocate the modern system of crown- and bridge-work. Since its introduction, it has doubled the work of high-class dentistry. We need a better class of mechanical dentists; it takes an artist to make a good set of artificial teeth. I want to commend the recent developments in swaging metal plates over a plaster die; it can accomplish results that are perfectly marvelous. Nothing can approximate a lower plate of aluminum, swaged over a plaster die, with rubber attachments. It goes in like a wafer, and there will be no ulcerative absorption in the lower jaw. If the teeth are imperfectly occluded, the lower plate moves and slips about, and hits the mucous membrane here and there till the tissue becomes hypertrophied, and finally there remains only a soft bed for the plate to rest on. But there is less absorption under an aluminum plate swaged between two metal surfaces and driven home on a plaster die; it fits so beautifully that you can bring out the rugæ in an upper plate. You have all seen those soft, mushy jaws, where all the anterior part is like a second tongue; but you will have no more of that if you will adopt the swaged aluminum. I earnestly recommend the process of swaging metal plates over the plaster die, and assure you you need not break the model.

I have a suggestion to offer for the setting of all-gold crowns and the abutments of bridges, which can be utilized in many cases. Take an isolated tooth, say a molar, with a living pulp, getting the crown very exactly fitted; putting it on and taking it off over and over again occasions a great deal of pain to your patient. But take an accurate impression of the tooth to be crowned and make a metal die. Utilize the bearing upon the end so that the crown will go on exactly the same way as upon the tooth in the mouth. Make your crown, and when completed let your patient wear it for twelve or twenty-four hours, without cementing it on, so as to make sure that the occlusion is all right, that the band fits perfectly at the gum-margin, etc. Now oil your metal die slightly, fill your crown with gutta-percha, warm it, and keep pushing it on and slipping it off, warming it slightly, until it goes home perfectly. You have crowded out all the surplus gutta-percha, and know that you have just enough left in the crown to set it, and that it fits perfectly. Then warm it again and slip it on the root, and you give your patient no annoyance and no pain.

Dr. ALEXANDER. I prefer to smear the tooth with gutta-percha dissolved in chloroform, and then set the crown with cement.

(To be continued.)

AMERICAN DENTAL ASSOCIATION.

(Continued from page 762.)

SECOND DAY—*Morning Session.*

THE association was called to order at 9.15 A.M., President Crawford in the chair.

The consideration of Section V, Materia Medica and Therapeutics, was resumed, and Dr. JOSEPH W. WASSALL, of Chicago, read a paper, entitled, "The Disinfection of Pulpless Teeth."*

Dr. FRANK ABBOTT, New York, had been particularly and peculiarly interested in this paper for more reasons than one. He was naturally inclined to defend his own position on the subject treated of, as it had been attacked, and, as a teacher in one of the dental colleges, he wanted always to get the best light he could in cases of the kind for the benefit of his students. The crowning point of all scientific treatment is the result of it. We want nothing better, as proof of the value of a line of treatment, than a successful result. It may be that, under the treatment which the speaker advocates, germs and spores are left in the tooth, but if they are in a condition which makes it impossible to do any harm, he can see no objection to their presence. He has teeth among his patients which were treated twenty years ago; many others have been going along for ten or twelve years without any disturbance. We have had scientific treatment of pulpless teeth brought before us in many phases. One would drill out the canal to the apex, and many times this led the drill out through the side of the tooth. Another method was that described in the paper, the tooth being treated day after day until it was supposed to be cleansed of all germ spores: a dressing is applied for a day or two, then it is taken out and an opportunity given for more germs to get in. Every time the canal is opened you allow a fresh batch of septic material to enter to cause a renewal of the trouble. The next point is the condemnation in the paper of the treatment which the writer has practiced for ten or twelve years, and of which he has yet to see the first failure. Under this method, the moment the tooth is opened it is put under the influence of a powerful antiseptic and kept there till it is ready to be filled. Before the patient leaves the chair the canal is filled. He does not dry out the canal, and many of the oldest men in the profession will say it is impossible to do so thoroughly. Is there anything in the method which demands that the tooth shall be dried to commend it to men who are constantly working over the teeth? If it is thoroughly dried, a tooth is liable to break. Any one could read the method which the speaker advocated, as it is published in his book. He has said nothing there which is not true, nothing which is not demonstrated. All the teeth of the class referred to in the paper are treated in his practice in the manner there described. He considers that all the organic material in the canaliculi should be coagulated at once, which is one reason why oxychlorid of zinc is used; so, also, in the treatment of abscesses. He had practiced on the lines indicated for fifteen years. He believes there is nothing else so useful in the dentist's hands in the filling of these teeth as chlorid of zinc. Any one can treat pulpless teeth in the manner he advocates; only follow the directions and you will not fail once in a hundred times.

---

* This paper will be found at page 829, current issue, DENTAL COSMOS.

Dr. J. D. PATTERSON, Kansas City, thought that any one who has taken a tooth which had been in a diseased condition for some time after being filled, as advocated by Dr. Abbott, and afterward examined when extracted or in the mouth, ought to be satisfied that Dr. Abbott's method is incorrect. We should have the sterilizing agent penetrate to every portion of the pulpless tooth. He had seen teeth treated after Dr. Abbott's method which had afterward gotten into a deplorable condition; but if they are treated in the modern way, we don't find them in that condition. Not paying proper attention to the sterilization of the dentine of pulpless teeth is incorrect, and many low-grade troubles which develop in following years after the incorrect treatment are due to it. Why take any risk? Experience proves that pulpless teeth not treated in the modern method are apt to cause pericemental trouble at some future time.

Dr. W. H. MORGAN, Nashville, Tenn., felt that Dr. Patterson was correct as to the value of modern methods. He himself saw teeth in the forties, which had been treated by Chapin A. Harris, in which immediate root-filling was practiced. The main difference between Harris's method and that which is now accepted was that he drilled out the canal and used an antiseptic. In the *American Journal of Dental Science* for 1854 or '55, in an article by Dr. Charles W. Ballard, methods of securing cleanliness in the canals of pulpless teeth were described which were practically the same as the modern ways. There was some difficulty in drilling out the canal, but it was treated with antiseptics, using threads of silk for the application. Dr. Ballard's test for the completion of the treatment was that of odor, and the treatment was followed up for ten or fifteen days. That treatment has been followed successfully since that time by many dentists. The speaker could show teeth in Nashville in at least two mouths which were filled by him in the early fifties, and were still doing good service. Differences in temperaments modify results very considerably. Teeth in persons of the bilious temperament are more easily managed than in those of the lymphatic. In scrofulous persons the teeth are softer and require greater care. Take the colored race, among whom scrofulous troubles are common, for example. A pulpless tooth can hardly be preserved in them; in the mulattoes it is very difficult. He had found only two mulattoes, twenty-one years old or more, with perfectly sound sets of teeth. To go back and study what was done by Dr. Ballard in the early days shows that the so-called modern treatment of pulpless teeth is not modern after all.

Dr. ABBOTT. Our friend from Kansas City speaks of the odor from teeth filled in the way the speaker had before referred to. He (Dr. Abbott) had probably filled more teeth in this way than in any other, and he had yet to find one with the odor when filled properly. It is the proper filling that makes the difference.

Dr. W. C. BARRETT, Buffalo, N. Y., thought the old adage most applicable here,—the middle course is the safest That is the best course to follow in the conditions under discussion. The paper was not devoted to the treatment of pulp-canals, but to the management of the dentine in pulpless teeth, and it referred especially to the treatment of the contents of the tubuli in these teeth. These last, as is well known, are of an albuminoid character. The fact that a remedy recommended in these cases does or does not belong to the class of coagulants is not what causes him to use or refuse it. The contents of the tubuli will coagulate if you give them opportunity; it is the primary step in the melting out of the contents of the tubuli, and when once that is done, we need have no fear of any possible putrefactive agent that may find its way into these minute tubules. If he can seal the mouths of the tubules, that is all he wants, or any one else should care for. Hence, having once coagulated the contents and sealed the mouths of the tubuli, he will take his chances of future trouble. We are neglecting more important things when we descend, in our discussions here, too deeply into the minutiæ of operations. There is a middle ground in these matters which we can all occupy safely. In the management of such conditions as are described in the paper, when the source of infection lies in the canal, having sterilized that, we need not be solicitous about the entrance into the canal of microbes. He believes that honesty is our normal condition, and until we are badly instructed we will remain honest and choose that which is safest, the middle course, neither eschewing that which is necessary, nor devoting too much time to the splitting of hairs.

Dr. M. L. RHEIN, New York, in hearty sympathy with the object and tenor of the paper, believed that it fairly represents the present scientific aspect of the profession with reference to the septic conditions of root-canals, yet as its author had referred to a paper written by the speaker, he felt it incumbent upon him to take issue with it with regard to the effect of coagulating materials. In that paper the speaker had recommended the use of oil of cinnamon after the canals are thoroughly cleansed. His opinion coincides with that of Dr. Barrett as to the use of coagulants, yet in actual practice we are met by facts which show us that theory is sometimes overdrawn and that the facts do not follow out the line of theory ; in other words, it has been proved that the theory that coagulated tissue is a barrier to the further diffusion of the agent has been disproved so thoroughly and so frequently that it has no bearing on the case. But the author makes a mistake when he says that bichlorid of mercury mixed with peroxid of hydrogen, which contains muriatic acid, has a coagulating power ; the acidity nullifies the coagulating property. He agreed with the writer of the paper in his remarks about the drug used in Schreier's method, as described by its author, only extending its action a portion of the way through the dentine ; but there is no reason why we should avoid a good thing because its originator did not carry it through to its logical conclusion. The proper method is to remove the putrescent material left behind from the decomposition of the pulp as far as possible, and put the canal in condition to be readily filled. Under the method which the speaker had described in the paper before referred to, the tubuli were more open to the reception of disinfecting agents than by any other with which he was familiar. Bichlorid of mercury in peroxid of hydrogen causes their penetration by a most powerful germicidal remedy. Dr. Rhein then quoted from his paper the statement that if the canal was very putrescent he applied a dressing of oil of cinnamon, which would diffuse more rapidly than any other of which he knew. He had evidence in his own family that the taste of oil of cinnamon was perceptible in the mouth within forty-eight hours after its application in a root. The point he wanted to make was that what Dr. Wassall claims as coagulation really increases the diffusibility of the agents throughout the dentine.

Dr. WASSALL. Dr. Abbott seemed to think that no method was entirely successful in preventing a recurrence of trouble in pulpless teeth. That may be true, but it seemed to the speaker that we ought to adopt that method which is most nearly perfect. Dr. Abbott claims that he gets a successful result in sterilizing by the use of corrosive sublimate. The speaker wanted to call attention to the fact that sublimate is precipitated in the presence of albumin. The same objection holds to the suggestion of Dr. Rhein's, to use the sublimate in connection with peroxid of hydrogen, though he most likely gets penetration with the peroxid. As to the suggestion which had been made that a bad odor may arise from pulpless teeth treated by the immediate root-filling method, he was satisfied that if such teeth had been treated long enough with diffusive remedies before filling, this condition would have been overcome. Dr. Barrett thinks that the putrefactive matter which occupies the tubuli may be safely ignored. The speaker had dwelt on that point in the paper. He was convinced that many putrescent teeth with their roots filled perfectly have a peculiar soreness in their sockets, and he thought that that soreness came from putrid matter in the tubules, the irritation caused by it going through the interglobular space to the cementum and pericementum.

In reply to a question by Dr. Morgan, Dr. Wassall stated that he did not believe the contents of the tubuli do become mummified; they are broken down into peptones and ptomaines, and by osmosis pass into the tubules.

Section V was passed.

On motion of Dr. Joseph Head, time was granted to Dr. Crouse at 8 o'clock in the evening to present a report on the litigation in which the Dental Protective Association was engaged.

(To be continued.)

MINNESOTA STATE DENTAL ASSOCIATION.

THE Minnesota State Dental Association held its thirteenth annual meeting in Winona, August 19, 20, and 21, 1896. The following officers were elected: Dr. W. D. James, Tracy, president; Dr. F. S. Robinson, Plainview, vice-president; Dr. H. L. Cruttenden, Northfield, secretary; Dr. H. M. Reid, Minneapolis, treasurer; Dr. O. A. Weiss, Minneapolis, chairman executive committee; Dr. T. B. Hartzell, Minneapolis, master of clinics.

Minneapolis will be the next place of meeting.

H. L. CRUTTENDEN, *Secretary.*

DENTAL SOCIETY ANNOUNCEMENTS.

NORTHEASTERN DENTAL ASSOCIATION.

THE annual meeting of the Northeastern Dental Association will be held in Springfield, Mass., October 21, 22, and 23, 1896. An interesting meeting is promised, and a large attendance is desired.

EDGAR O. KINSMAN, D.D.S., *Secretary,*
Cambridge, Mass.

NEW HAMPSHIRE DENTAL SOCIETY.

THE annual meeting of the New Hampshire Dental Society will be held at Portsmouth, N. H., October 6, 7, 8, 1896. Members of the profession are cordially invited to be present.

F. F. FISHER, *Secretary,*
Manchester, N. H.

EDITORIAL.

CHEMISTS VS. DENTISTS.

A RECENT prosecution by the British Dental Association o a chemist for the illegal practice of dentistry at Cardiff has naturally aroused much indignation upon the part of the chemists, or, as they are known in this country, apothecaries, who it appears have enjoyed a considerable revenue from the extraction of teeth, and, in numerous instances, from the performance of other dental operations.

Of the case in question, the *Journal of the British Dental Association* for August 15, 1896, says,—

> "At Cardiff First Police-court, on Tuesday, July 28, the stipendiary (Mr. T. W. Lewis) had further cases brought before his notice arising from prosecutions taken out under the Dentists Act of 1878. The first defendant was Templar Malins, of Woodville-road, Cardiff, who was represented by Mr. Alfred Jackson. Mr. T. H. Belcher appeared on behalf of the British Dental Association to prosecute, and stated that the proceedings were taken out under Section 3 of the act, which forbade any person to take an addition or description implying that he was registered under the act, or specially qualified to practice dentistry. Defendant carried on business as a chemist at 107, Woodville-road, and outside his shop he had placarded the words, 'Popular dentistry.' A member of the Dental Association had gone to the shop, and had been given a card bearing defendant's charges for extracting teeth, with or without gas. These facts were admitted by the defense, and in mitigation Mr. Jackson urged that there was no desire on the part of Mr. Malins to make his clients believe that he was a fully-qualified dentist. Defendant was fined £5 and costs, or in default one month's imprisonment."

Several other prosecutions of a similar character have been brought, with the result that the provisions of the "Dentists Act" have in each instance been sustained.

The real issue appears to hang upon the meaning of the word "qualified," as used in the act as applied to practitioners of dentistry. The interpretation of "qualified" by those who have been sufferers from its effects is, in some cases, amusing, to say the least.

In a letter published in the September issue of the *Chemist and Druggist*, a correspondent who signs himself "Dens" says,—

> "Can we fight the dentists? In my opinion we *must*. Having extracted, probably, ten thousand teeth during the past thirteen years, I consider myselt 'highly qualified' to perform these operations, and should resent any interference with what I consider my just rights. From the astounding decisions of the Cardiff stipendiary our rights appear to be in peril."

There can be no question of the specific qualification of an extractor of teeth whose ghastly record has reached ten thousand operations. It is not that he lacks qualification to do the operation, but rather that he lacks the judgment to restrain him from needlessly doing it. The letter quoted is but one of many in which the real reason for opposition to the prohibitive effect of the Dentists Act is the cutting off of a more or less lucrative part of the business of the chemist. There can be no doubt as to the final result of the controversy which the chemists are now raising a fund to prosecute to a conclusion. The rightfulness of the act prohibiting the practice of dentistry by those who are incompetent will be sustained by the courts of England just as the same principle has been sustained everywhere that such laws exist.

Laws prohibiting incompetent persons from practicing any department of the healing art are founded upon the broad question of the right of a community to protect itself from injury, a right which is incontestable. And when a community enacts a law establishing the standard of competency of its practitioners of medicine or dentistry, the constitutionality of such an act can only be called in question when it can be shown that its provisions are inequitable in their application.

The English law, as do all others of similar intent, establishes not only the standard of competency, but indicates the means by which such competency may be attained, and the only hardship that results is in its effect upon the class of individuals who want the emoluments of professional work and who are unwilling to fulfill the requirements which enable them to legally attain them. The fact that certain chemists have attained proficiency in the art of relieving their clients of their dental organs is in no degree evidence that they are competent, much less qualified, in the sense which the law intends they should be. If their claim were conceded, then by the same reasoning they should be permitted to perform any other surgical operation in which continued practicing upon a long-suffering public had developed for them a reasonable proficiency.

There can be no doubt as to the final outcome of the chemico-dental controversy, with the result that the chemists will find that, even though they "can fight the dentists," they will lose the fight on the issue as raised.

DR. J. LEON WILLIAMS'S LETTER.

THE following communication appears in this place because it was received after that part of the DENTAL COSMOS devoted to correspondence had been printed, and further because, in the interest of justice and right, matters of this character are entitled to immediate publication while the issue is freshly before the profession.

The appearance of the letter of Dr. Williams in the editorial department of the DENTAL COSMOS is in no sense whatever to be taken as an indication of the position of the editor of this journal with reference to the question under discussion. It is merely an expression of the general policy of the journal to afford opportunity for a fair hearing of all sides of a question of this character.

"DR. WILLIAMS AND THE ASSOCIATION OF FACULTIES."

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—The editor of the *International Dental Journal*, in the August number of his magazine, administers, under the above heading, a rebuke for my criticism of the action of the National Association of Dental Faculties in indorsing Bödecker's "Anatomy and Pathology of the Teeth" as a text-book for dental students. His editorial begins by charging me with ignorance of the real functions and actions of the organization, and ends by saying that its position (presumably upon any question) is not likely to be changed by criticism from any quarter. Between these two wholly unwarranted and uncalled-for statements he has sandwiched an attempted explanation which is not only the severest possible comment upon the head and tail of his editorial, but which also, I fear, further complicates an already difficult position.

It is just possible that in making my criticism I had quite sufficient information for my purpose, and it is also possible that the editor of the *International* is not speaking for the entire board of the National Association of Dental Faculties when he intimates that they are above and beyond criticism. At least, I hope not. The "high and mighty" kite is a very pretty one to fly, but as related to the law of gravitation it is as all other kites. It is liable to fall and get injured.

It is a mistake, and a mistake that savors of puerility, to assume that I have any desire to criticise the general position of the National Association of Dental Faculties. On the contrary, I do not yield to the editor of the *International* or to any one else in respect for the organization, or in admiration for the splendid work which it is doing. Its formation was the most important step in the educational interests of dentistry since the establishment of the first dental college.

But the days of infallibility are past. Mistakes are possible in all human deliberation. I believe the National Association of Dental Faculties to be composed of able, earnest, and honest men, who are doing much for the advancement of dental education in America. But I am not aware that they are all experts in the field of dental histology, and if there be experts on the committee which recommended the indorsement of Dr. Bödecker's book, I will venture the assertion that they did not sanction the action of their confrères.

Now, what are the facts about this matter? It seems to me that the editor of the *International* has done his best to conceal them by a most equivocal and disingenuous statement. I will try to analyze this statement, and the readers of the *Journal* can then form their own opinions as to the rightness or otherwise of my position.

The editor seems to grudgingly admit that the Association of Faculties *did* indorse the book. He then attempts to minimize the significance of this indorsement by an explanation which, if accepted for the plain meaning on its face, places the board in a most ridiculous position. He says, "The recommendation is not understood to carry with it any indorsement of the *peculiar views*" (the italics are mine) "held by an author."

Now, let us keep to the point. The sole *raison d'être* of the book under discussion is the promulgation of the *peculiar views* of the author. He himself implies this in the preface to his book. Aside from these *peculiar views*, aside from the Heitzmann theories of cell-structure, organization and degeneration of tissue, there is not a page or a line in the book which could offer a reasonable excuse for its existence. The truth of this statement will be apparent to any one who has read the book if they will for a moment try to think of what would remain of this work if the *peculiar views* were struck out. It would be in the nature of a desecration to make the old comparison of the play of Hamlet with the Danish prince removed. The National Association of Dental Faculties *has*, from every practical point of view, indorsed the *peculiar views* in Dr. Bödecker's book or they have indorsed nothing, and this point cannot be escaped by any amount of quibbling or dodging. The next statement which the editor of the *International* makes would, if accepted, place the board in a still more unenviable position. The indorsement, he says, "simply means that an author has published a book worthy of men engaged in teaching." The plain and unmistakable meaning of this is that the board recommends this book to the consideration of professional histologists. It would say to Dr. Black, Dr. Andrews, Dr. Sudduth, and men of like position, "Here, gentlemen, is a book worthy of your attention." Such a suggestion, coming to any of these men, would be regarded as a mere absurdity, or as a piece of colossal and ignorant impudence, according to the humor or point of view of the individual. It would really have no serious significance whatever, and the editor admits this in his further statement: "If the ideas conveyed therein are in accord with those held by any given faculty, they may be taught, or if in opposition they may be antagonized." In other words, the situation is precisely the same, so far as teachers are concerned, as it would have been if the board had given no indorsement.

Of course the Association of Faculties intended nothing of this sort. It simply meant to give this book a status which should recommend it to those not already familiar with the *peculiar views* of its author. Any other interpretation of its action leaves the organization in a position worthy only contempt or ridicule. If any further proof is needed of this position it can be found on the title-page of the work under discussion, where one may read the following statement: "Adopted by the National Association of Dental Faculties as a text-book for dental students." Mark the word "adopted." It has not merely been recommended, but accepted as a text-book for dental students. The fact that the faculties of all the colleges are still free to use the book or not has nothing whatever to do with the question which I raised.

The book has been published two years, or thereabouts, and so far as I am aware, the very clear and emphatic statement on the title-page which I have quoted has not been challenged. Every member of the board is undoubtedly aware of the publication of that statement, and of the effect which it must have on dental students.

It has not been denied or called in question. Now then, I ask, can the editor of the *International* expect any reasonable person to accept his explanation? And I ask more than that: I want to know why he attempts to escape from the force of a fact which a large majority of the dental profession must be familiar with by holding me up as an object of criticism for merely calling attention to the said obnoxious fact?

Dr. Bödecker says the National Association of Dental Faculties has adopted his book as a text-book for students. His statement has not been officially denied, but the editor of the *International* takes it upon himself to say that it has not only *not* been adopted, but that the board has not even suggested that it be so used. It thus appears that the only misunderstanding at present evident is not on my part, for I have only called attention to certain facts and statements, but is between the association and Dr. Bödecker, or between the editor of the *International* and the association and Dr. Bödecker.

I shall watch the attempts at reconciling these flatly contradictory statements with much interest. But, pending this interesting performance, I must positively and emphatically decline to be held up in front of the establishment as a target under cover of which the responsible parties may attempt to make their escape through the back door of a pretended explanation.

To many in the United States it may seem that the whole business is not worth all of this trouble, and that it would have been better to have let the matter entirely alone. But such an opinion could only be based on a lack of knowledge of the facts. It is entirely true, as I have stated, that the publication in Bödecker's book of the indorsement of the National Association of Dental Faculties has brought contempt and ridicule upon the dental profession in America. Quite apart from the *peculiar views* which constitute the bulk of the book, it is full of misrepresentation and contradiction, beginning with the effort which the author makes, on the first page of the preface to his work, to drag in the great name of the late Professor Huxley in support of his position, on to the closing pages. A careful and critical review of this work would probably come as an astounding piece of dental literature to most dentists in America. An eminent teacher in Germany has summed up his opinion as follows: "Messrs. Heitzmann and Bödecker have made immortal fools of themselves in several treatises."

Pages could be filled with opinions of this sort from the most eminent teachers and specialists in this department of science in the world. It matters not, therefore, so far as the vital question is concerned, whether the Association of Faculties intended to indorse the book as a work of reference, a work for teachers, or a book for students. It was a great and lamentable mistake, and has brought discredit to the organization, and the sooner the mistake is rectified the better it will be for all who are interested in the scientific status of dentistry in America.

J. LEON WILLIAMS.

BIBLIOGRAPHICAL.

EXTRACTION OF THE TEETH. By J. F. COLYER, L.R.C.P., M.R.C.S., L.D.S., Dental Surgeon and Lecturer on Dental Surgery to Charing Cross Hospital; Assistant Dental Surgeon to the Dental Hospital of London. London: Claudius Ash & Sons, Ltd., 1896.

In this little book of one hundred and five pages the author has arranged in five chapters a most satisfactory exposition of the subject of extracting, which as a safe guide to the performance of the operation leaves little to be desired. The chapter divisions are: I, General Principles; II, Extraction of Individual Teeth; III, Extraction of Misplaced Teeth; IV, The Use of Anesthetics during the Extraction of Teeth; V, Difficulties, Complications, and Sequelæ of the Extraction of Teeth. An Index assists materially in reference.

GRAY'S ANATOMY, DESCRIPTIVE AND SURGICAL. A new edition, thoroughly revised by American authorities from the 13th English edition. 772 illustrations. 8vo, pp. 1200. Philadelphia, Lea Bros. & Co., 1896. Price, with illustrations in colors, cloth $7.00, leather $8.00; with illustrations in black, cloth $6.00, leather $7.00.

The new edition of Gray appears in entirely new dress, printed in attractive type and with 135 new engravings, which show the excellence of the most modern methods of illustration.

When a work has been, as this one, not a standard, but the standard for almost forty years, very nearly all has been said of it that the reviewer can say. No book needs higher praise than is implied in the rapid exhaustion of its previous large editions.

In such quickly shifting subjects as the collateral sciences of medicine, it is remarkable that a plan devised in 1858 and continued and elaborated for thirty-eight years should be found so sound, rational, applicable, and comprehensive as to still meet the modern requirements. The work in this particular is unique.

The present American edition has received such a thorough revision that it is virtually a new work, save for its general plan. The literary acumen of the editors is to be heartily commended, for, without adding inordinately to the size of the volume, the text has undergone searching revision, bringing the sections fully abreast of the latest work in all anatomical fields, excepting, perhaps, one.

The subjects of dental embryology and histology, and, indeed, the anatomy of the whole head have received their most elaborate investigation at the hands of dentists. The results of this work are part of the standard literature of dentistry.

In view of its importance to dental students, the section dealing with this anatomical field should fully embody the established facts. This can best be done by one not only trained in dentistry, but especially as a dental anatomist. Only by this method can the subject be clearly, sympathetically, and exhaustively set forth. The claims of dental anatomy to a just recognition in this work, which has been for so long a recognized text-book in our dental schools, are warranted by its extensive use by dental students, and a work so nearly perfect in all other particulars should not be lacking in the respect referred to.

We called attention in our review of the thirteenth edition to some of the points in which improvement of the dental phase of the work was needed. Many of these have been corrected, but the opportunities for further improvement in this regard are still large, and we trust that the necessity for it will be practically recognized in the next edition.

During the past two years several important discoveries have been made by Dr. M. H. Cryer in the anatomy of the maxillary bones which have a direct and practical surgical bearing. Some discussion of these, together with the mode of making the sections, should receive consideration. The section dealing with dental embryology should be modified and modernized.

Several important additions have been made in illustrating the distribution of the fifth pair of cranial nerves, which will be invaluable to the dental student and dental practitioner, for year by year an increasing interest centers in the study of dental neurology, as many of the most important and most common disorders which the dentist combats are those of the terminals of the branches of this nerve.

An attempt to detail the scope of all the additions to the present edition would require a small volume, as they are more extensive than is ever expected of a new edition.

DENTAL LEGISLATION.

MARYLAND STATE DENTAL LAW, PASSED APRIL 4, 1896.

An Act *to repeal article thirty-two of the Code of Public General Laws, entitled "Dentistry," and to re-enact said article, with amendments.*

Section 1. Be it enacted by the General Assembly of Maryland, that Article thirty-two of the Code of Public General Laws, entitled "Dentistry," be, and the same is hereby repealed and re-enacted, so as to read as follows:

Sec 2. It shall be unlawful for any person to practice dentistry in this state unless such person shall have obtained a certificate, as hereinafter provided.

Sec. 3. There shall be a State Board of Dental Examiners, which shall consist of six practicing dentists of recognized ability and honor, who have held regular dental diplomas for five years, whose duty it shall be to carry out the purposes and enforce the provisions of this act. The members of said board shall be appointed by the governor out of a list of nine dentists proposed by the Maryland State Dental Association, and chosen by a majority vote of the members of said association present at a meeting called for that purpose, of which meeting two weeks' notice shall be given. The term for which the members of said board shall hold their office shall be for six years, except that the members of said board first to be appointed under this act shall be designated by the governor to serve: One-third for a term of two years, one-third for a term of four years, and one-third for a term of six years, unless sooner removed by the governor, and until their successors shall be duly appointed. In case of a vacancy occurring in said board, such vacancy shall be filled by the governor from the list above mentioned. Any member of said board who shall be absent from two successive regular board meetings shall cease to be a member of it.

SEC. 4. Said board shall choose one of its members president and one secretary thereof, and shall hold regular meetings in May and November of every year, and special meetings, as occasion may require. A majority of said board shall at all times constitute a quorum, but a less number may adjourn from time to time; the proceedings thereof shall at all reasonable times be open to public inspection. The board shall make a report of its proceedings to the governor by the first day of December in each year.

SEC. 5. Any person, twenty-one years of age, who has graduated at, and holds a diploma from, a university or college authorized to grant diplomas in dental surgery by the laws of any one of the United States, and who is desirous of practicing dentistry in this state, may be examined by said board with reference to qualifications, and, upon passing an examination satisfactory to said board, his or her name, residence, or place of business shall be registered in a book kept for the purpose, and a certificate shall be issued to such person. Any graduate of a regular college of dentistry may, at the discretion of the examining board, be registered without being subjected to an examination.

SEC. 6. All certificates issued by said board shall be signed by its officers and bear its seal.

SEC. 7. A temporary certificate for a specified time may be issued by the officers of said board to any applicant holding a regular dental diploma duly registered by a board of dental examiners created by the laws of any one of the United States, but no such certificate shall be issued for any longer time than until the next regular meeting of the board. The fee for this temporary certificate shall be five dollars.

SEC. 8. Transcripts from the aforesaid book of registration, certified by the officer who has the same in keeping, with the seal of said board of examiners, shall be evidence in any court of this state.

SEC. 9 A fee of ten dollars shall be paid to the secretary of the board by any applicant for examination and registration, which money shall be used towards paying the expenses of the board.

SEC. 10. Every person shall be said to be practicing dentistry within the meaning of this act who shall, for a fee, salary, or other compensation, paid either to himself or to some one else for services rendered, perform operations or parts of operations of any kind pertaining to the mouth, treat diseases or lesions of the human teeth or jaws, or correct malpositions thereof.

SEC. 11. Any person who shall violate any of the provisions of this article shall be deemed guilty of a misdemeanor, and, upon conviction thereof, in any court having criminal jurisdiction, shall be fined not less than fifty dollars or more than three hundred dollars, or be confined not more than six months in the county jail, or if the conviction takes place in Baltimore city in the Baltimore city jail, in the discretion of the court. All fines received under this act shall be paid into the common school fund of the city or county in which such conviction takes place.

SEC. 12. Nothing in this article shall be so construed as to interfere with the rights and privileges of resident physicians and surgeons, or with persons holding certificates duly issued to them prior to the passage of this act, and dental students operating under the immediate supervision of their instructors in dental infirmaries of dental schools chartered by the General Assembly of Maryland.

SEC 13. And be it enacted, that nothing in this act shall prevent, or be so construed, as in any way to hinder the prosecution, conviction, or punishment of any person, who may have offended against any of the provisions of said Article thirty-two of the Code of Public General Laws, or against any of the provisions of any of the Acts of Assembly of which the same was a codification.

SEC 14. And be it enacted, That this act shall take effect from the date of its passage.

PERISCOPE.

THE NEW REGULATIONS RELATING TO THE DIPLOMA IN DENTAL SURGERY OF THE ROYAL COLLEGE OF SURGEONS OF ENGLAND.—These regulations will come into force on and after January 1, 1897.

Education.—Candidates who register as dental students after January 1, 1897, are required to pass three examinations—the Preliminary Science Examination, the First Professional Examination, and the Second Professional Examination—and to produce the following certificates before admission to the several examinations:

Preliminary Science Examination.—1. Of having received instruction, at an institution recognized for the purpose, in chemistry, physics, and practical chemistry.

(This instruction may be taken prior to the date of registration as a dental student.)

First Professional Examination.—2. Of having been engaged, during a period of not less than three years, in acquiring a practical familiarity with the details of mechanical dentistry, under the instruction of a competent practitioner, or under the direction of the superintendent of the mechanical department of a recognized dental hospital, where the arrangements for teaching mechanical dentistry are satisfactory to the board of examiners in dental surgery. In the case of qualified surgeons, evidence of a period of not less than two instead of three years of such instruction will be sufficient.

(This instruction may be taken prior to the date of registration as a dental student.)

3. Of registration as a dental student by the General Medical Council, 229 Oxford street, London, W.

4. Of having attended at a recognized dental hospital and school:
   (*a*) A course of lectures on dental metallurgy.
   (*b*) A course of practical dental metallurgy.
   (*c*) A course of lectures on dental mechanics.
   (*d*) A course of practical dental mechanics, including the manufacture and adjustment of six dentures and six crowns.

Second Professional Examination.—5. Of having been engaged during four years in the acquirement of professional knowledge, subsequently to the date of registration as a dental student.

6. Of having attended at a recognized dental hospital and school:
   (*a*) A course of dental anatomy and physiology
   (*b*) A separate course of dental histology, including the preparation of microscopical sections
   (*c*) A course of dental surgery.
   (*d*) A separate course of practical dental surgery.
   (*e*) A course of not less than five lectures on the surgery of the mouth.*

7. Of having attended at a recognized dental hospital, or in the dental department of a recognized general hospital, the practice of dental surgery during two years.

8. Of having attended at a recognized medical school:
   (*a*) A course of lectures on anatomy.
   (*b*) A course of lectures on physiology.
   (*c*) A separate practical course on physiology.

---

* These lectures may be given either at a recognized dental hospital and school, in which case the lecturer must be a qualified surgeon practicing surgery, or they may be given at a recognized medical school, and may form part of the course required by Clause 8 (*d*).

(*d*) A course of lectures on surgery.

(*e*) A course of lectures on medicine.

9. Of having performed dissections at a recognized medical school during not less than twelve months.

10. Of having attended, at a recognized hospital or hospitals, the practice of surgery and clinical lectures on surgery during two winter sessions.

11. Of being twenty-one years of age.

(The certificate of professional study will be required to show that students have attended the courses of professional study to the satisfaction of their teachers.)

NOTE.—Professional study prior to the date of registration as a dental student is not recognized except in the case of chemistry, physics, and practical chemistry, and of instruction in the details of mechanical dentistry (see Clauses 1 and 2), and will not be counted under any circumstances in lieu of part of the four years' study subsequent to the date of registration as a dental student, required by Clause 5.

Examinations.—1. The preliminary science examination consists of chemistry, physics, and practical chemistry, and will be identical with Part I of the first examination of the Examining Board in England. Candidates may present themselves for this examination before entering at a dental school on production of the certificates required by Section I, Clause 1.

A synopsis of the examination in chemistry, physics, and practical chemistry may be obtained on application.

A candidate who shall produce satisfactory evidence of having passed an examination for a degree in medicine on any of the subjects of the first examination conducted at a university in the United Kingdom, in India, or in a British Colony, will be exempt from examination in the subjects in which he has passed.

A candidate referred in this examination will be required, before being admitted to re-examination, to produce a certificate that he has received further instruction in the subjects, to the satisfaction of his teacher, at an institution recognized for the purpose by the Examining Board, for a period of not less than three months subsequent to the date of his reference

2. The first professional examination consists of mechanical dentistry and dental metallurgy, and will be partly practical and partly oral. Candidates may present themselves for the first professional examination for the license after the completion of six months' attendance at a recognized dental hospital and school, on production of the certificates required under Section I, Clauses 2, 3, and 4.

A synopsis of examination in dental metallurgy will shortly be issued.

A candidate referred in either or both of the subjects of the first professional examination will be required, before being admitted to re-examination, to produce a certificate, in regard to mechanical dentistry, of having received six months' further instruction under the conditions specified in Section I, Clause 2; and, in regard to dental metallurgy, a certificate of having received, subsequent to the date of his reference, not less than three months' instruction in that subject, to the satisfaction of his teacher, in a recognized dental school.

3. The second professional examination consists of general anatomy and physiology, general surgery and pathology, dental anatomy and physiology, dental pathology and surgery, and practical dental surgery.

The examination is partly written, partly practical, and partly oral.

The written examination comprises general anatomy and physiology, general pathology and surgery, dental anatomy and physiology, and dental pathology and surgery.

At the practical examination candidates may be examined—

(*a*) On the treatment of dental caries, and may be required to prepare and fill cavities with gold or plastic filling or material, or to do any other operation in dental surgery.

(Candidates must provide their own instruments.)

(*b*) On the mechanical and surgical treatment of the various irregularities of children's teeth.

The oral examination comprises the several subjects above mentioned, and is conducted by the use of preparations, casts, drawings, etc.

Candidates may present themselves for the second professional examination on production of the certificates required under Section I, Clauses 5 to 11, after the completion of four years' professional study from the date of registration as a dental student and after the lapse of not less than six months from the date of passing the first professional examination.

A candidate referred at the second professional examination will be required to produce, before admission to re-examination, a certificate of three months' additional study at a general hospital and a special dental hospital, the precise attendances required at each hospital being left to the discretion of the respective hospital authorities.

Candidates who have passed the second examination of the Examining Board in England, or who shall produce evidence of having passed the examination in anatomy and physiology required for the license in surgery of the Royal College of Surgeons in Ireland, or the Faculty of Physicians and Surgeons of Glasgow, or an examination in anatomy and physiology required for a degree in medicine or surgery at a university in the United Kingdom, will be exempt from re-examination in those subjects.

Candidates who are members of the college, or who have passed the examination in surgery of the Examining Board in England, or who shall produce evidence of having passed the examination in surgery for the license in surgery of the Royal College of Surgeons of Edinburgh, the Royal College of Surgeons in Ireland, or the Faculty of Physicians and Surgeons of Glasgow, or an examination in surgery for a degree in medicine or surgery at a university in the United Kingdom, will be exempt from re-examination in general surgery and pathology.

4. The fee for the diploma of the license in dental surgery is twenty guineas, and is payable in the following manner, viz :

			£	s.	d.
Preliminary Science	Examination.	Each admission	3	3	0
First Professional	Do.	Do.	2	2	0
Second Do.	Do.	Do.	5	5	0

The balance, if any, of the total fee of twenty guineas to be paid on the completion of the several examinations, before the license is granted.

5. The preliminary science examination will be held in January, March or April, July and October in each year.

The first and second professional examinations will be held in May and November in each year.

Candidates are required to give fourteen clear days' notice of their intention to present themselves for examination.—*Journal of the British Dental Association.*

Touch Bulbs in Dentine.—A paper on this subject was read by R. T. Stack, M.D., F.R.S.I., L.D S. In connection therewith several lantern slides were shown, and the paper took the form of explanations of the pictures presented. The author said he thought there was some warrant for assuming that the definite formations which appeared near the ends of the dentinal tubules when they had entered the enamel might fairly be set down to have a connection with the sense of touch. The first slide showed the processes of odontoblasts, having been pulled out from the dentinal tubules ; and tracing that somewhat further, they came to the ramification and intercommunications of the dentinal tubules, and finally, to those definite endings in the enamel which appeared in a more or less bulbous shape. On reflecting what a wonderfully delicate sense of touch there was on the surface of the enamel, it would not be surprising to find a special development of the nerve endings at the inner side of the enamel, or, as far as possible, produced into the internal structure of the enamel. There were between the enamel and the dentine, and between the cementum and the dentine, and in the substance of the dentine itself in certain cases of defective development, spaces of a different character, more irregular in shape, both in the cases of the granular layers under the cementum and the enamel, and spaces also irregular, but in the main with an irregularity capable of explanation, in the interglobular space of defective development. In young teeth, where the calcification of the dentine was not complete, there were spaces very much of the same character as those of the interglobular spaces. In the case shown of a young tooth, the space in all probability would have become entirely obliterated if the tooth had grown. One or two specimens were shown where a somewhat similar space was found toward the outer surface of the dentine close to the cementum. With regard to a later slide, the author thought the definite fusiform space could be traced into absolute connection with the large cement-corpuscle, and would seem to point to some interchange of nutrient material between the cementum and the dentine. Further slides pointed rather to a general force communication between the cement-corpuscles and the dentinal fibrils. With regard to the expansive bulbs in the under surface of the enamel, there was a great difference between the smooth outside surface of the enamel—on which no bacterium should be able to find a footing—and the inner surface, hollowed out, a very haunt for bacterial invasion. With regard to the somewhat similarly shaped spaces in the surface of the dentine close to the cementum communicating freely with the cemental corpuscles, he would ask was it yet established how far the dentine of a tooth from which the contents of the pulp-chamber had been removed might be considered to be a dead tooth, or how far nutrition in the sluggish form required by the dentine might not be carried on in the collateral plasmic circulation through the cement-corpuscles, and the fusiform dilatation in the dentinal tubules.

Mr. Caush said that in staining he had found in many cases that there had been an absolute intercourse between the tubuli and the spaces found especially in the newly deposited tissue of dentine. He had been able to obtain stains passing right through into the enamel, even in the ground sections.

Mr. Tomes said that Mr. Mummery had a lantern slide of Dr. Dentry which probably he might show. The specimen showed a body very much of the form of many familiar nerve-end organs, but it had a big hole in the dentine. It was obtained from the dentine of a temporary tooth. Mr. Mummery and himself had been looking at hundreds of dry sections of temporary teeth, and had never found anything like it. There was a little doubt about accepting the view that nerve-end organs were common, or existed at all in the principal nerves of the dentine. If they were there he thought they would have a greater regularity. The occasional finding of a space which looked like a nerve-end organ was not enough to prove that it contained a nerve-end organ unless the thing had ceased to be functional and was in process of disappearance. The whole physiology of dentine, and particularly of those outer layers, was very much unknown, and there were difficulties in the way of accepting Dr. Stack's or any other views.

Mr. Mummery exhibited Dr. Dentry's specimen.

Mr. F. J. Bennett thought they should pause before attributing to many of the specimens shown by Dr. Stack a highly healthy condition.

Dr. Stack, in reply, said he had no "views" on the subject. He had tried, however, to show that the spaces were of a sufficiently regular character to warrant the assumption that they contained developments of the fiber. But when he said that the enamel had no doubt a delicate sense of touch, he did not mean to convey the impression that the enamel itself was sensitive. He meant that with a tolerably thick enamel on the top of the tooth there was a provision by which it could feel the minutest thing on it, and he could hardly conceive that that could be the case without some specially developed nerve on the inner surface. He did not lean to any particular view as to how the sensation was conducted.—*Proceedings British Dental Association, from the Dental Record.*

Electro-Guaiacocain Cataphoresis: Its Application to Extraction, Sensitive Dentine, and Exposed Pulps.—The idea of driving medicaments into tissue electrically is by no means new. Indeed, it is said to date back to the early fifties. Some eight years ago I covered a large field of experiments with a view of discovering a method of electrically injecting cocain into sensitive dentine (searching for that Utopia of dental surgery,—a reliable obtundent). I had to suspend my experiments at that time owing to the fact that I could not procure or manufacture a method of reducing a current to zero,—this being absolutely necessary, as tooth matter is sensitive to one-eighth of a volt and sometimes less. My attention was strongly recalled to the matter by a paper by Dr. W. J. Morton, of New

York (Professor of Diseases of the Mind and Nervous System and of Electro-Therapeutics), which was quoted in *The Electrical Review* of July 26, 1895, on "Bleaching Teeth with H_2O_2 by means of Electro-Cataphoresis," and again by a paper by him in the DENTAL COSMOS of January, 1896. In this latter paper I saw that the Electro-Therapeutic Company, of New York, had devised the very current controller for which I had so long and vainly sought. After much correspondence and (seemingly) a curious hesitancy on the part of the company to supply the instrument, I managed to procure the Wheeler Volt Selector which I now show you. The milliampere meter is not a necessary part of the apparatus, and I use it simply to indicate the amount of current passing and of estimating the amount of leakage. Now, as to current, I do not favor the street-supply, for, as I have already mentioned, a sensitive tooth will feel the minutest fluctuation. I prefer a primary or secondary current as being absolutely steady. Without doubt the most easily managed primary battery for dental purposes is my modification of the Poggendorf cell (see Proceedings of British Dental Association, August, 1895), but I find it more simple to use the "Gardner Plant" with 7 E. P. S. Co.'s L type storage cells as a governor, keeping the cells fully charged. From this source you have a constant current of fifteen volts (about) always ready for use. Dr. Morton gives as his formula, an eight per cent of cocain hydrochlor. in guaiacol. I have, however, obtained better results with a twenty per cent. solution. Guaiacol when electrolized has an abominable and penetrating odor. I have therefore concocted the following formulæ, either of which is more fragrant. Guaiacol cum cocain twenty per cent.—of the above two parts, otto of roses one part; or guaiacol cum cocain twenty per cent., two parts of this to one part heliotropin. These are the positive solutions. The negative or sponge solution is,—solution sodium chlorate twenty per cent. Now, as regards the practical working of the apparatus. Join the wires from the selector to the batteries. You have now to find the positive pole. The most simple method is to moisten a piece of white blotting-paper (which has been saturated with iodid of potassium) and place it across the terminals, turn the knob until the dial indicates 10, in about one minute the positive pole will turn the paper a dark brown. To this screw you attach the application wire, to the other the negative or sponge wire. The subject of the present demonstration is a lateral incisor,—pulp unexposed and fully alive. I propose to anesthetize the pulp through the thick layer of carious dentine, expose it and remove it. The surrounding parts are first dried, and then protected by a napkin or dam, and any metallic filling is varnished with shellac varnish or gutta-percha solution. In this case there will be a good deal of current leakage, as the two centrals are metal-backed pivots. The sponge electrode is saturated with the salt solution, and is held tight in the patient's hand. A small pledget of wood saturated with guaiacocain *cum rosa* is placed in the cavity, the indicator is placed at zero, and the needle applicator placed against the pledget. The current is now turned on very gently, and without a jerk, the patient's lower eyelids being carefully watched, as they give the immediate indication of the current being felt. On that indication the current is to be slackened, say one-third of a volt, and left stationary for a minute, and in this way you proceed until the patient is unconscious of any increase or cessation of current. The time necessary varies from seven to forty-seven minutes, depending largely on the condition of the patient and the initial current which can be borne without pain. (The pulp took forty-two minutes to cataphorise and remove.) I do not recommend you to try it for extraction, for, although the extraction is painless, the guaiacol has too strong an escharotic action on the mucous membrane. It appears to me that the great utility of this guaiacocain cataphoresis is in such cases as this,—viz, for immediate treatment of exposed putrescent and aching pulps. Suppose a case presents itself with pulp-exposure possessing the distinct phosphatic odor,—isolate it with dam,—cataphorise it (this, as a rule, only takes seven minutes), excavate thoroughly, and cover it with a transparent celluloid cap (the advantage of these transparent caps is that you can see the actual exposure) and fill right off. I know it is heresy to publish such a treatment in defiance of "the books," but I argue that if you mummify and embalm the pulp, and then seal it up, you cannot have any more trouble, and such has been my practical experience with this treatment for six months.—*Report of Clinical Demonstration by H. B. Ezard, L.D.S. Edinburgh, before the British Dental Association Meeting, London, August 12, 1896; from the Dental Record.*

PAINLESS EXTRACTION OF TEETH.—Schleich's (*Therap. Monatsch.*, May, 1896, p. 269) cocain solution, employed to produce infiltration anesthesia before extraction of a tooth, is as follows :

℞—Hydrochlorate of cocain, 0.2 gram ;
Hydrochlorate of morphin, 0 025 gram ;
Sterilized chlorid of sodium, 0.2 gram ;
Antipyrin, 2 grams ;
Guaiacol, 2 drops ;
Sterile distilled water, q.s., or 100 grams.

Anesthesia, produced by injecting this fluid, is said to continue about half an hour.—*Medical News.*

◆

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

The abbreviations of titles used are those common to bibliographical work, and will, it is presumed, be readily comprehended by any one familiar with dental or scientific publications. Any explanation will be gladly furnished by the compiler. A star (*) indicates a Thesis.

Bell (Victor C.) Popular essays upon the care of the teeth and mouth. London, Gay & Bird, 1896.

Funke (E.) * Beitrage zur Anatomie des Ramus maxillaris Nervi trigemini. Königsberg i Pr., 1896, Hartungsche, 43 p., 1 l.

Herbst (W.) Methoden und Neuerungen auf dem Gebiete der Zahnheilkunde. Berlin, 1896, 296 p. 8°.

Kan något goras för motarbetandet af den hos barn progressiot tilltagande tandcaries-freqvenseu? [Can anything be done to ameliorate the frequency of the progressively increasing caries of the teeth in children?] Helsingfors, 1896, 42–66.

Miller (W. D.) Lehrbuch der conservirenden Zahnheilkunde. Leipzig, 1896, Thieme, 420 p.

Neugebauer (B.) * Uber Messungen des weichen Gaumens mit Darstellung einer neuen Messungsmethode. Königsberg i Pr., 1896, Liedtke, 36 p., 3 l. 8°.

Wiesendanger (R.) Schädigung der Volksgesundheit durch die moderne Zahnheilkunde. Ein Mahnwort Zur Aufklärung des Publikums. Berlin & Neuwied, 1896, Heuser, 41 p. 8°.

Welch's Monthly : A monthly magazine of dental-art, science and literature. No. 1, v. 1, Aug. 1896. 8°. Philadelphia.

Allen (H. J.) Fœtor ex ore. Pathology and therapy. Dental Cosmos, Phila., 1896, xxxviii, 626–630.—**Beadnell-Gill** (H.) On the advisability of branches undertaking their own prosecutions. J. Brit. Dent. Ass., Lond., 1896, xvii, 526–535.—**Beausoleil** (R.) L'inflammation aiguë de l'amygdale linguale. Cong. franç. de méd., 1895, Par., 1896, ii, 657–660.—**Beddoe** (J.) Anthropology and medicine. Syst. Med. (Allbutt), N. Y. & Lond., 1896, i, 21–36.—**Billmeyer** (U. D.) The use of cocaine for the extraction of the pulp. Dental Headlight, Nashville, 1896, xvii, 105–107.—**Bliss** (F. W.) Aluminized gutta-percha. Pacific Stomat. Gaz., San Fran., 1896, iv, 321–325.—**Bottome** (F. A.) Report of a case of secondary hæmorrhage following tonsillotomy. Med. Rec., N. Y., 1896, l, 316.—**Bowtell** (H. R.) Platinum in its relation to dental prosthetics. J. Brit. Dent. Ass., Lond., 1896, xvii, 437–441.—**Brunton** (G.) Some experiments in colouring porcelain for teeth and gum bodies or enamels. Brit. J. Dent. Sc., Lond., 1896, xxxix, 650–652.—**Callan** (J.) Report of a case of compound comminuted fracture of right superior maxillary and of inferior maxillary. N. Orl. M. & S. J., 1896–7, xlix, 160-164.—**Canton** (F.) Inaugural address upon dental education. Lancet, Lond., 1896, ii, 519.—**Carpenter** (G.) Facial herpes secondary to tooth ache. Pediatrics, N. Y. & Lond., 1896, i, 396.—**Caush** (D. E.) Exostosis. Dental Rec., Lond., 1896, xvi, 289-292, 1 pl.—**Choquet** (J.) Quelques considérations sur les altérations anatomiques de la dent occasionnées par la carie dentaire. L'odontologie, Par., 1896, 2. s., iii, 402-408.—**Colyer** (J. F.) The early treatment of crowded mouths. Brit. J. Dent. Sc., Lond., 1896, xxxix, 585-591.—**Coulliaux** (L.) Anatomie, physiologie, pathologie der Zahnpulpa (des Menschen). Correspondenz-Blatt f. Zahnärtze, Berl., 1896, xxv, 215-226. ——— *Also:* Gior. di corrisp. p. dentisti, Milano, 1896, xxv, 6-16; 95.—**Coxon** (S. A.) A new method of adapting springs and the mode of their manufacture. J. Brit. Dent. Ass., Lond., 1896, xvii, 430-436.—**Cumston** (C. G.) Clinical considerations on infectious gingivites. Internat. Dent. J., Phila., 1896, xvii, 481-488.—**Cunningham** (G.) Avantages d'un enseignement méthodique de la prothèse dentaire. L'odontologie, Par., 1896, 2. s., iii, 390-396.—**Dalamore** (W. H.) Ueber Abschürfung und die Entwicklung secundaren Dentins. Correspondenz-Blatt f. Zahnärzte, Berl., 1896, xxv, 242-247.—**Dalma** (D.) Ueber ein neues sehr verlässliches Mittel zur Wurzelbehandlung. Vrtljschr. f. Zahnh., 1896, xii, 251-253.—**Depage.** Quatre cas d'extirpation du pharynx. Ann. Soc. belge de chir., Brux., 1895-6, iii, 166-178. ——— De l'ablation de la base de la langue par la voie sous-hyoïdienne. *Ibid.:* 310-313.—**Dieck** (W.) Ueber eine ungewöhnliche Kaumuskelwirkung. Deutsche Monatschr. f. Zahnheilk., Leipz., 1896, xiv, 274-276.—**Douglas** (J. C.) Teeth and toothache in the olden times, with a few of the superstitions and beliefs belonging thereto. J. Brit. Dent. Ass., Lond., 1896, xvii, 422-430.—**Duguet.** Sur un cas d'actinomycose bucco faciale guéri. Bull. Acad. de méd., Par., 1896, 3. s., xxxvi, 36-41.—**Farrar** (J. N.) Regulirung einer complicirten Unregelmässigkeit der Zahne eines 30 jährigen Mannes. Correspondenz-Blatt f. Zahnärzte, Berl., 1896, xxv, 256-264.—**Fell** (G. E.) Value of the Fell method of forced respiration as a safeguard in anæsthesia. Ohio Dent. J., Toledo, 1896, xvi, 382-390.—**Fenchel.** Die Zahnverderbniss und deren Verhütung. Correspondenz Blatt f. Zahnärzte. Berl., 1896, xxv, 195-215.—**Ferri** (E.) Delinquenti ed onesti. Scuola positiva, Fiesole, 1896, vi, 321-328.—**Fletcher** (M. R.) Interrupted dentition. N. Orl. M. & S. J., 1896-7, xlix, 89-95.—**Fox** (C.) A dentist among the smallpox. Brit. J. Dent. Sc., Lond., 1896, xxxix, 591-594.—**Goldthorpe** (E. C.) Aluminum. Dental Rev., Chicago, 1896, x, 571-573.—**Greve** (H. C.) Ueber die Berichtigung der frühzeitigen Extraction des sechsjährigen Molaren. Deutsche Monatschr. f. Zahnheilk., Leipz., 1896, xiv, 318-330.—**Griffin** (E. H.) Two cases of an enlarged ascending pharyngeal artery, situated on the posterior wall of the pharynx. Med. Rec., N. Y., 1896, l, 247.—**Guy** (G. H.) The future of dentistry electrically considered. Internat. Dent. J., Phila., 1896, xvii, 491-497.—**Haidle** (A. W.) The absorption of the roots of the temporary teeth. Dental Reg., Cincin., 1896, l, 388-396.—**Harrison** (H. H.) Popular dental education. Ohio Dent. J., Toledo, 1896, xvi, 377-382.—**Heath.** Geriefte und syphilitische Zähne. Correspondenz Blatt f. Zahnärzte, Berl., 1896, xxv, 231-236.—**Hiatt** (N. W.) Necrosis. Dental Reg., Cincin., 1896, l, 375-378.—**Hixon** (J. F.) Advantages of compressed air in operating room and laboratory. Ohio Dent. J., Toledo, 1896, xvi, 368-371.—**Hoff** (N. S.) What should the dentist do to prevent decay of the teeth. Dental Reg., Cincin., 1896, l, 379-388.—**Hunt** (G. E.) Antiseptics. *Ibid.:* 365-369.—**Hunt** (Phineas George Channing.) [1827-1896.] Biography. *Ibid.:* 413-416.—**Johnson** (G. E.) Physiological antagonism. *Ibid.:* 369-373.—**Jones** (J. N.) Die Behandlung der temporären Zähne. Correspondenz-Blatt f. Zahnärzte, Berl., 1896, xxv, 248-253.—**Kimball** (R. H.) Dentistry in the Orient. Dental Rev., Chicago, 1896, x, 551-561.—**Koecker** (Leonard R.) [1822-1896.] (Obituary.) Dental Cosmos, Phila., 1896, xxxviii, 707.—**Leggo** (W. A.) Ueber locale Anästhetica. Correspondenz-Blatt f. Zahnärzte, Berl., 1896, xxv, 236-241.—**Lundy** (E. A.) Dentistry in India. Pacific Stomat. Gaz., San Fran., 1896, iv, 302-308.—**Macaigne & Vanverts.** Phlegmon sublingual (angine de Ludwig) à pneumocoques. Presse méd., Par., 1896, 360-363.—**Mason** (W. L.) Detachable porcelains for crown- and bridge work. Dental Cosmos, Phila., 1896, xxxviii, 636-638. ——— A system of detachable facings. Internat. Dent. J., Phila., 1896, xvii, 488-491.—**Matas** (R.) Fracture of the zygomatic arch: a simple method of reduction and fixation, with remarks on the prevalence, symptomatology and treatment of this fracture. N. Orl. M. & S. J., 1896-7, xlix, 139-157.—**Maxwell** (G. A.) Differential diagnosis. Dental Cosmos, Phila., 1896, xxxviii, 621-626.—**Miller.** Démonstration de quelques preparations de dents et de machoires. Progrès dent., Par., 1896, xxiii, 193-197.—**Morrison** (T. H.) Reflex facial neuralgia. Dental Rev., Chicago, 1896, x, 569-571.—**Morton** (T. S. K.) A case of removal of the major portion of the lower jaw for sarcoma. Am. J. Dent. Sc., Balt., 1896, xxx, 126-129.—**Morton** (W. J.) The X ray and its application in dentistry. Dental Rec., Lond., 1896, xvi, 332-336—**Moty.** Evolution vicieuse de la dent de sagesse. Bull. méd. du nord., Lille, 1896, xxxv, 534.—**Nyman** (J. E.) The relations of general systemic pathological conditions to diseases of the mouth and teeth. Dental Rev., Chicago, 1896, x, 561-568.—**Peretz.** Zur Geschichte der künstlichen Zähne. Correspondenz-Blatt f. Zahnärzte, Berl., 1896, xxv, 226-231.—**Phocas** (G.) Kyste dentaire. Nord. méd., Lille, 1896, ii, 115-117.—**Pitoy.** Moyen pratique et économique de reproduire en cire polychromée les anomalies, tumeurs, affections buccales en général. Rev. Odontol., Par., 1896, xxxviii, 305-309.—**Porter** (W.) Primary erysipelas of the pharynx. N. York M. J., 1896, lxiv, 221.—**Ranken** (J. G.) Oral hygiene. Dental Rec., Lond., 1896, xvi, 293-300.—**Read** (W. R.) Crowns. Brit. J. Dent. Sc., Lond., 1896, xxxix, 686-697.—**Röse** (C.) Das Erkrankungsverhältniss der einzelnen Zähne des menschlichen Gebisses. Vrtljschr. f. Zahnh., 1896, xli, 233-251.—**Rockwell** (H. C.) Why gold fillings fail. Ohio Dent. J., Toledo, 1896, xvi, 365-368.—**Rollins** (W.) An oral camera for Röntgen photography. Internat. Dent. J., Phila., 1896, xvii, 497-499.—**Rose** (H.) Mounting swivels on a gold plate. Brit. J. Dent. Sc., Lond., 1896, xxxix, 633-637.—**Roughton** (E. W.) Parasitic affections of the mouth. *Ibid:* 625-633.—**Roy** (M.) Médication de la douleur. L'odontologie, Par., 1896, 2. s, iii, 396-402.—**S.** (L. D.) Resident versus visiting dentists. Brit. J. Dent. Sc., Lond., 1896, xxxix, 697-699.—**Sachse** (B.) Zur Kalibehandlung pulpenloser Zähne. Deutsche Monatschr. f. Zahnheilk., Leipz., 1896, xiv, 330-334.—**Schlemmer** (A.) Das Zahnziehen. Vrtljschr. f. Zahnh., Wien, 1896, xii, 213-225.—**Schmid** (H.) Die Pathologie des oberen Weisheitszahnes. *Ibid:* 137; 253.—**Schmitt.** Névralgie épileptique spasmodique du nerf maxillaire inférieur. Echo méd., Toulouse, 1896, 2. s., x, 354-356.—**Schuhmann** (H. H.) Early diagnosis, and in brief, the treatment of tumors of the jaw. Dental Rev., Chicago, 1896, x, 573-583.—**Sewill** (H.) Diagnostic du mal de dents et des névralgies d'origine dentaire. Progrès dent., Par., 1896, xxiii, 197-204.—**Shotwell** (F. A.) Suggestions as to the proper enforcement of our State dental laws. Dental Headlight, Nashville, 1896, xvii, 107-110.—**Smith** (P. T.) The qualifications necessary for the dental practitioner. Internat. Dent. J., Phila., 1896, xvii, 500-502.—**Spalding** (Christopher W.) [1814-1896.] (Obituary.) *Ibid:* 547.—**Starck** (H.) Ganglions cervicaux tuberculeux en relation avec des dents cariées. Rev. de la tuberculose, Par., 1896, 123-131.—**Talbot** (E. S.) Pyorrhea alveolaris. Dental Cosmos, Phila., 1896, xxxviii, 660-679.—**Telschow.** Des avantages des appareils en aluminium en prothèse dentaire. L'odontologie, Par., 1896, 2. s., iii, 421.—**Thompson** (A. H.) The variations of the teeth in relation to temperament. Dental Cosmos, Phila., 1896, xxxviii, 630-636.—**Tomes** (C. S.) On the chemical composition of enamel. J. Brit. Dent. Ass., Lond., 1896, xvii, 451-457. ——— Further notes upon amalgams. *Ibid:* 457-463. ——— A case of calcification of a widely exposed pulp. Brit. J. Dent. Sc., Lond., 1896, xxxix, 577-584.—**Tousey** (S.) Dental cases in the province of the general surgeon. Charlotte [N. C.] M. J., 1896, ix, 169-172.—**Walkhoff** (O.) Ueber den Bau und die Entstehung einiger Zahnmissbildungen. Deutsche Monatschr. f. Zahnheilk., Leipz., 1896, xiv, 261-273, 2 pl.—**Walton** (J. C.) The fate of Associations. Dental Cosmos, Phila., 1896, xxxviii, 638-642.—**Washbourn** (J. W.) Some points in connection with the bacteria of the mouth. Brit. J. Dent. Sc., Lond., 1896, xxxix, 673-686.—**Williams** (J. L.) On the formation and structure of dental enamel. J. Brit. Dent. Ass., Lond., 1896, xvii, 463-467, 4 l.—**Wilson** (G.) On the so-called abnormal form of the jaw. West. Dent. J., 1896, x, 321-327.—**Witzel** (J.) Ueber Zahnwurzelcysten, deren Entstehung, Ursache und Behandlung. Deutsche Monatschr. f. Zahnheilk., Leipz., 1896, xiv, 305-317.—**Wood** (P. G.) Gold filling.—considerations of minor details. Ohio Dent. J., Toledo, 1896, xvi, 372-376.

◆

LIST OF UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING AUGUST, 1896.

August 4.—No. 565,273, to F. C. HOWE. Fountain tooth-brush.
" " No. 565,326, to K. R. BRAGG. Combined articulator and flask and dental process.
" *11.*—No. 565,533, to T. DELL-RICHARD. Angle attachment.
" *18.*—No. 566,103 to H. F. WAITE. Electrical dental apparatus.
" " No. 566,220, to ABRAM PELJAM. Pneumatic dental plugger.
" " No. 566,207, to SAMUEL MIGNAULT. Press for dental flasks.
" *25.*—No. 566,667, to J. D. CUTTER. Dental floss-holder.
" " No. 566,695, to W. L. MASON. Detachable porcelain tooth-crown.

THE

DENTAL COSMOS.

VOL. XXXVIII. PHILADELPHIA, NOVEMBER, 1896. NO. 11.

ORIGINAL COMMUNICATIONS.

TREATMENT OF PYORRHEA ALVEOLARIS.

BY ARTHUR C. HUGENSCHMIDT, M.D., D.D.S., PARIS, FRANCE.

THE different methods of treatment which have been employed, since the first description of that disease given by Fanchard in 1746, are very numerous. They can be, however, divided into two great classes :

First. Surgical methods.

Second. Medical methods.

Among the surgical methods, we shall first mention the radical treatment recommended by Fanchard and Jourdain in 1746. These authors, having remarked that this disease always ended by the certain and inevitable falling out of the teeth, advised the early removal of the affected organ. In our days even, some practitioners do not hesitate to employ this radical process to arrest the disease in its progressive tendency and prevent the infection of a healthy dental articulation by a neighboring one diseased.

Toward 1757 Bourdet, and at the beginning of our century Toirac, were the first to protest against the systematic removal of the teeth, and recommended the following method : To make on the gum an incision having the form of a V, the summit being directed toward the extremity of the root, and circumscribing a triangular flap corresponding to the neck of the tooth. When the flap was detached, they passed a small spherical or olivary cautery on the denuded portions and then abandoned the parts to natural healing. Oudet, in 1835, and Magitot, in 1867, rejected this method, after having employed it, on account of the loss of gum-tissue necessitated by the extirpation of the flap.

American practitioners have also modified this method. So as to expose in its entire surface the denuded portion of the root, they recommend not to make the incision starting from the neck of the tooth toward the apex, but by inserting the point of the lancet at a point corresponding to the apex of the gum attachment and cutting toward the neck, and finally cauterizing the internal surface of the flaps with nitrate of silver or carbolic acid.

In 1888 Dr. Cruet exhibited before the Society of Stomatology a modification of this operation, which he makes in the following way: Using a pair of straight and very thin scissors, one of the blades is introduced between the gum and tooth; a vertical section is then made up to the end of the pus-cavity. With curved scissors the lateral flaps are cut away as near the point of detachment as possible; the hot iron (galvano-cautery) is then passed along the cut surface. The operation is made on all the affected teeth in one or several days, and the patient is submitted to antiseptic mouth-baths. Supplementary cauterization may be necessary.

Among the other surgical methods, and prominent among them, is the one advanced by Riggs, of the United States, in 1875, which consisted in carefully scraping the surface of the root of the tooth so as to remove all salivary calculus, and also in removing the alveolar process, which he said to be in that disease in a "necrosed" state.

G. V. Black, of Chicago, to render this scraping more radical, even recommends, in certain cases, to make on the gum, at a point corresponding to the apex of the tooth, a curved incision, the convexity being turned toward the cervix of the tooth, so as to be able through this opening to scrape carefully the root and invaded alveolus, and then close the wound by sutures.

Younger, of San Francisco, after having removed the tartar which is always present on the root of the teeth, cauterizes the cavity formed by the detached gum with a solution of zinc chlorid $\frac{1}{30}$, and if, after this treatment, the gum does not adhere to the neck of the tooth, he rapidly passes on its internal surface a small piece of cotton dipped in pure liquid ammonia.

If, moreover, the gum is so much detached that the anterior surface of the roots of teeth are uncovered and fall outward when the lower lip is drawn forward and downward, he does not hesitate, to maintain the gum in contact with the teeth, to pass a silk thread through the two gums, both external and internal, and through the interdental space on each side of the tooth, and to ligate the gums in contact with the tooth, being careful not to tie it too strongly, or else the ligature would cut through the gum.

Younger also employs re-implantation in cases of extreme elongation of the incisors and neighboring teeth; the moving tooth is removed, the alveolus deepened, and the tooth replaced *in situ* and held by ligatures or an apparatus.

Among the medical processes, we shall mention the one recommended by Magitot in 1867, which was very energetic and which was bound to give good results, as it was a real antiseptic treatment; we refer to cauterizations of the gingival pockets with pure chromic acid, the tartar having been previously removed. As additional treatment, Magitot recommended the use of chlorate of potash in tablets, scarification of the gums, leeches, and finally purgative mineral water for the general state of health.

In 1880, Aquilhon de Sarran passed a thread through the lowest point at which the gum detachment reaches, leaving the thread in place.

In 1881, Witzel, who introduced the infectious theory, after having removed the tartar, used small syringes with fine gold canula to wash out the pus-pockets with the following formula :

Iod. of potassium, 5 grams ;
Carbolic acid,
Chlorid of zinc,
Alcohol, *aa* 25 grams ;
Hydrochloric acid, 2 grams ;
Distilled water, 10 grams ;
Essence of mint, 5 grams.—M. and filter.

In 1884, Malassez and Galippe, who made a very careful study of this disease, advised the partial destruction of the gum forming the alveolar pockets, followed by washing with bichlorid solution.

William H. Atkinson washed the pockets with aromatic sulfuric acid, which is a solution of pure acid, 1 in 10.

Harlan, of Chicago, used iodid of zinc and iodoformed ether.

E. C. Kirk, of Philadelphia, solution of aristol, 1 in 10.

Charles B. Atkinson, a caustic paste composed of two-thirds caustic potash and one-third crystallized carbolic acid.

Finally, peroxid of hydrogen, used by the whole American school. Cravens lately has also advised an excellent method, nitrate of silver, but used in a peculiar manner, which allows one to reach to the bottom of the infected pocket. A very fine platinum wire is heated to redness, dipped in pulverized nitrate of silver ; it is then rapidly passed in the flame of an alcohol lamp, to melt the nitrate on the wire, so that one has really a small stick of nitrate of silver, which is easily passed down in the pus-pocket.

Other treatments have been employed : Oudet, the purgatives and seton ; Velpeau and Banchet, cauterization with nitrate of silver and alum ; Marchal de Calvi, tincture of iodin ; Després, chlorid of zinc ; and Vidal, the perchlorid of iron.

The most important therapeutic consideration in this disease is the local treatment, yet one must not exclude the general treatment, which in certain cases is of very great help.

We intend to contribute a special article upon the pathogeny of this disease, and we consider personally this affection to be an alveolar infection, identical with the pathological process of osteomyelitis, alveolar infection of stapyhlococcial origin, developing, on a predisposed ground, the arthritic diathesis.

The disease begins by gingival inflammation, then periostitis of the alveolar crest ; finally, when the periosteum covering the crest of the alveolus is destroyed and the osseous tissue open to infection, alveolitis, with concomitant periostitis of both the periosteum of the external surface of the alveolus, as well of the periosteum of the internal surface or dental ligament.

Witzel, in 1881, had already indicated the localization of the disease in the alveolus, giving it the name of "infectious alveolitis."

Considering the above-mentioned lesions, what is to be done? First, to remove radically the tartar as well as the infected alveolus, with the infected neighboring tissues, and finally completing the operation by an energetic disinfection of the operative field.

The first indication is the removal of the tartar. This operation, which is considered at first sight as a very easy one, we consider, after sixteen years' practice, as one of the most minute and difficult operations made in the oral cavity. We do not speak, of course, of the removal of the apparent tartar, but of the invisible form of the calculus which can ascend or descend as far as the apex of the tooth, granular tartar which progressively invades the pericementum, while the alveolus infects itself and melts before it, until the tooth falls. It is, then, this invisible calculus, this tartar which can be semi-solid, and which is often found in microscopical quantities, which must be removed. To perform this operation special instruments are necessary. Those which we have found best adapted are those of Cushing, of Chicago, and those of Riggs.

The removal of the sub-gingival tartar, to be perfect, must be made not only with instruments necessitating a movement of traction toward the operator, but principally with those indicated above which necessitate a pressure toward the apex. After a short time one can feel very readily, through the intermediary of the instrument, the slightest rugosity on the surface of the root, and this must be carefully removed.

It is especially on the approximal or lateral surfaces of the roots of teeth that the hardest and most difficult tartar to remove is found, and it is the one which is most often forgotten. Often one believes he has completely cleansed the surface of a root, anteriorly and posteriorly, and yet suppuration continues. In this case, if one searches on the sides of the root, being careful beforehand to introduce a pellet of cotton for a few minutes between the gum and the root, to expose that region, one is surprised to find a small mass of tartar, which when removed suppresses all suppuration. It is especially for this lateral tartar that the thin instruments of Cushing are useful.

As soon as minute particles of tartar have been detached it is wise to immediately wash out the cavity left with peroxid of hydrogen, not so much for its antiseptic properties, but above all for its bubbling action, which brings to the surface the least particle of detached tartar, which, if left in the cavity, would furnish the point of departure of a new calculus, and, consequently, of a new alveolar infection.

As soon as the tartar is removed, and the gum-pockets well marked out with hydrogen dioxid, curetting of the alveolar borders must be resorted to and performed with the same instruments as above, passing all around the tooth if the gum detachment is generalized, or only on one of its faces if the external or internal surface is normal. This alveolar curetting is really only the scraping of the alveolus recommended by Riggs before even the introduction of the infectious theories.

In the great majority of cases we do not use cocain, as the patient experiences no pain, the pain appearing being an indication that the normal or least invaded part is reached. After having washed several times with peroxid of hydrogen, the third step of the operation, the important one, is performed.

We use as cauterizing agent pure concentrated sulfuric acid.

After having well dried the gingival pocket where curetting has been performed, we dip a platinum wire the size of a small nerve-broach into the glass containing the sulfuric acid, and we introduce the wire so charged between the gum and root as far as it will go without force. If the infection is great, one must not hesitate to make two or three applications of the acid in the same manner. The parts are then syringed with bicarbonate of soda solution. Each gum-pocket is treated in the same manner, and the patient is sent away for a few days. An important point: to cauterize the gum of the lower jaw the patient is maintained in the sitting posture, while to cauterize the peridental spaces of the superior teeth the patient must be thrown backward, the head being placed in forced extension, so that the apex of the pockets is on a lower level than the neck of the tooth, and the drug can reach to the bottom of the cavity.

At the second sitting, if the pockets have been well curetted and cauterized, a great change in the local state will be observed; around a great many teeth the suppuration will have completely disappeared, and teeth which were very shaky become much consolidated.

If the gum-pockets are deep, and if a great number of teeth are invaded, several sittings may be necessary; but the operator, as well as the patient himself, has the satisfaction every time of noting a great amelioration in the local state of affairs, until the complete disappearance of pus and all inflammatory phenomena.

It is evident that, when the whole alveolar wall has disappeared, one cannot expect to reproduce it; but even in these cases repeated application of sulfuric acid at long intervals, by producing a cicatricial tissue in these gum-pockets, brings on a cicatricial contraction and a firmer implantation of the tooth.

It has been tried in the United States, and we have done it ourself, to fill up certain considerable loss of substance, to fill up the gap with sterilized sponge. Unfortunately the oral cavity is a septic ground, and when the bacteria penetrate into the sponge, all the arts which serve to defend the mouth against the invading microbe cannot act, and the sponge becomes a source of infection, which is not the case when the sterilized sponge is used to fill up certain cavities, left after the extirpation of neoplasms in other regions of the organism, which can be maintained in an aseptic state.

Several objections can be made to the use of pure sulfuric acid. One can say that this acid, being a very energetic acid, can act much beyond what is expected from it and produce great loss of substance. This could be, if one employed a large quantity of this drug, like a practitioner to whom I recommended the drug and who, wishing to be more radical, introduced the acid with a hypodermic syringe, which resulted in large sloughing of gum and alveolus. But we do not hesitate to say that any physician—specialist or not—can make these cauterizations as indicated without the slightest danger. We have never hesitated, when the patient left us to go to the country where no specialist could be found, to refer the treatment to the physician, and we have never heard of nor seen any accident. In our practice, in nine years that we used this method, having made several thousand cauterizations, we have never met with the least accident.

Another objection. Pure sulfuric acid being so strong, can attack the tooth-substance very readily. This, however, is not the case, and pure acid attacks the tooth-substance much less rapidly than the diluted acid, such as the aromatic, which has the strength of one-tenth. We have treated several rare cases of pyorrhea alveolaris, in arthritics with cutaneous diseases, who very frequently have a recurrence of their pyorrhea corresponding with a renewal of activity of their cutaneous lesions. In one case in particular, which has been followed for six years, and where the teeth have been preserved on account of frequent cauterizations, there does not exist the least trace of attack of the tooth by the acid, nor any dental caries.

One can also object that the acid renders the neck of the tooth very sensitive to heat and cold—to extremes of temperature.

Clinical observation has shown me that patients do not complain more of extremes of temperature than they do after removal of the tartar. Here, again, concentration of the acid plays an important part. The pure monohydrated acid introduced into the gum-pockets destroys rapidly the organic substances, not excepting the dentinal fibrillæ or nervous terminations which it may reach, yet does not destroy the inorganic tissues. On the other hand, diluted acid does not attack the organic tissues, but acts very energetically on the osseous salts, so exposing the dentinal fibrillæ without destroying them, hence increasing the dentinal sensibility.

In any way, by introducing the acid as we have indicated it, one can very well cauterize the parts situated in the gum-pockets only without touching the neck of the tooth. We shall even add that in certain cases of extreme sensibility of the neck of the teeth, as is often present in pyorrhea where we have employed this treatment, the sensibility has greatly diminished and even completely disappeared.

In any case, the important point is to carefully cauterize the crest of the infected alveolus, where the acid is expected to act, not only as a destroyer of still infected tissues, but also as an energetic antiseptic, and even as a decalcifier of small particles of tartar which would be forgotten in these pockets.

The tartar having been carefully removed and the gums cauterized with care, one must insist on the patient following strictly the hygiene of the mouth. Twice a day at least, morning and evening, the teeth must be brushed with an antiseptic powder, more or less strong, according to the quality or rapidity of formation of the tartar.

If the tartar is present in small quantity, we recommend the following formula :

Saccharine, 0.20 centigram ;
Menthol, 1 gram ;
Boric acid, 2 grams ;
Salol, 4 grams ;
Soap, 10 grams ;
Carbonate of lime,
Carbonate of magnesia, *aa* 20 grams ;
Essence of peppermint, 1 gram.—M.

If the patient has a great deal of tartar and cleanses his teeth with difficulty, we advise the addition to the above powder of five or ten grams of pumice powder.

The teeth being well cleansed, one must twice a day, morning and evening, resort to *massage of the gums*, two minutes at least each time. This massage must not be performed with the brush, but with the index finger. With the brush, patients find the process too painful and do it very imperfectly, while with the index finger they can use friction very energetically on the gums, both upper and lower, inside and outside the arch. Massage stimulates the circulation of the gums and replaces imperfect mastication; for we know that all patients suffering from pyorrhea fear to use their teeth,—they do not masticate any more, take the least possible solid food, no crust of bread, no hard food. It is the contrary that we must recommend to our patients: they must masticate as much as possible, eat crust, chew even a neutral hard substance, chewing-gum, etc. A very striking example of what occurs when the teeth are not employed is met with in the dog. The hunting dog, the street dog, the one which picks up the first bone he can get and bites at it, even breaks and masticates it, this dog never has pyorrhea alveolaris, nor does he exhale any bad odor; the pet dog, ladies' dogs, who never live outside, who are not allowed to touch a bone from fear of intestinal perforation, etc., but only eat soft food of all kinds,—these dogs, all of them, lose their teeth by pyorrhea, and exhale a very bad odor.

After the massage the patient must take antiseptic mouth-baths with determined antiseptic solutions, which is a very important part of the preventive treatment.

During the course of the active treatment the patient must take three mouth-baths of five minutes each,—one after each meal. Later on two will be sufficient, one in the morning, the other in the evening. On these prescriptions one must never put mouth-washes, for in these cases patients only keep the antiseptic solution, at the utmost, thirty seconds in the mouth, which is absolutely insufficient for any serious effect; for we must not forget that the strongest antiseptic, such as the bichlorid 1-1000, necessitates at least two minutes of presence in the mouth to be effectual.

On our prescriptions we always put mouth-baths of five minutes each *by the watch*, and we explain to the patient that it is absolutely necessary that such be the case; that is, that the antiseptic solution be continuously in contact with the mouth for at least from five to ten minutes. We recommend particularly the solutions of carbolic acid 1-100, and solutions of chloral hydrate 1-100. After fifteen days the one-half per cent. solutions are sufficient.

As a *resumé* the treatment consists:

First, in curretting minutely the pathological peridental space, removing the tartar and infected alveolar crest.

Second, in cauterizing energetically the gum-pockets with pure sulfuric acid.

Third, consecutive treatment, consisting in attending strictly to the care of the teeth, massage of the gums twice daily, and the continuous use of antiseptic mouth-baths.

A REPLY TO DR. ANDREWS.

BY J. LEON WILLIAMS, D.D.S., L.D.S., LONDON, ENG.

In reading over my recent contributions to the Cosmos on the subject of enamel formation and structure, previous to dispatching them to the editor, it occurred to me more than once that I might be charged with wearisome iteration in my efforts to make a somewhat difficult subject easy of comprehension to those who were not experts in this particular field. The character of much of the work that I had to present naturally led me to anticipate discussion and criticism, and I was therefore especially desirous that my meaning should always be clear, and thus misunderstanding and misinterpretation avoided. Vain hope, for here comes the one man whose name I would have mentioned as likely to be my most sympathetic and appreciative reader with a critical address full of misinterpretations, misquotations, and misunderstanding.

Dr. Andrews has increased the difficulty of my position by interspersing his criticism with some very generous words of praise concerning my work. He enters the arena with all the courtesy of a high-born knight of the olden time, and he leaves it with a gracious smile and a wave of the hand. He thus places me under high obligation to be equally generous, which is certainly in accordance with my disposition ; but my difficulty is that, if I give a plain analysis of his own utterances, I shall have to be more severe than I desire to be. He has exposed the weak points in his armor so many times and in so many places that I must either refuse the courted thrust or take the chance of inflicting a hurt. But those who ride to jousts probably do not expect to escape without bruises.

My first difficulty in reading Dr. Andrews's address was to understand why he should have wished to deliver a criticism on my paper before the last instalment, and that by far the most important part, had been published. Why such haste to place himself on record? There is not only abundant evidence in Dr. Andrews's critical review of great haste in preparation, but it is also clear that he had not read all even of that part of my paper which had appeared in the COSMOS at the time when he delivered his address. I can only conjecture that this hurried review was prompted by over-enthusiasm for the subject, or by the stress of getting up some theme for his address at short notice.

But whatever the explanation, it seems to me a grave mistake to so hurriedly examine and criticise a paper which is the result of several years' careful work.

It is always possible to get new points of view, even when one has long been familiar with the subject under consideration.

Dr. Andrews's criticisms have reference principally to four points in my paper,—viz, the structures which I have called *the ameloblastic membranes*, the distribution of blood-vessels to the enamel-organ, the structure and function of the cells of the *stratum intermedium*, and the structure and function of the ameloblasts.

I have to observe, first, that in quoting from my statements concerning the ameloblastic membranes, Dr. Andrews has selected such passages as are least conclusive, from my point of view, while he has passed over without notice the *facts* which are most damaging to his own interpretation. Dr. Andrews says the appearances which I have described "are familiar to all investigators," and "have been constantly seen when studying the earlier stages in the growth of enamel."

Now, what were the essential points which I made in my paper concerning the appearances of this structure ?

First, that I had demonstrated, by a variety of staining methods, the existence of a discrete substance—a substance which shows a definite chemical reaction in the presence of certain stains—lying between the ameloblasts and the forming enamel. My second point was, that in a great majority of my specimens a structure evidently identical in character with the one just mentioned may be seen lying between the ameloblasts and the *stratum intermedium*. These two structures always seem to react upon any given stain in precisely the same manner. They are identical in appearance, and I therefore conclude, from the foregoing facts, that they are identical in structure and composition.

I must call upon Dr. Andrews to refer me to any previous work in which these particular facts, which, from my point of view, are significant and important, have been noted and described. I thought that I had made it perfectly clear in my paper that I was aware this appearance had not only long been known, but that it had also long been the subject of dispute and speculation. My effort was to determine by selective staining whether or not this appearance was due to the existence of a specific structure. Dr. Andrews is at liberty to place any interpretation upon the appearances shown in my photographs that best suits his own ideas, providing he keeps within the facts as I have stated them. I will return to this point again before the close of my rejoinder.

On the question of the blood-supply to the enamel-organ, Dr. Andrews seems greatly perturbed by a fear that I am going over to the Heitzmann school in suggesting that the *stratum intermedium* is a kind of connective tissue. Of course, this is all pure assumption on his part. I have suggested nothing of the sort. In truth, one would think I had made sufficiently definite pronouncements upon the teachings of the Heitzmann school to put such a suggestion entirely beyond the most active imagination. But even if I had stated precisely what Dr. Andrews suggests, it would have been a far more credible notion than his suggestion that fibers originating in connective tissue penetrate *stratum intermedium* and ameloblastic cells and contribute to the formation of enamel. Surely, if one were looking for radical revolution in our ideas of histology, it might be found here. But more of this anon.

If Dr. Andrews will now take the trouble to carefully read what I have really said upon this point, he will, I think, find it reasonably clear and consistent. I have said that the development of blood-vessels appears in the *stratum intermedium* at an early stage in the formation of the tooth. That this is perfectly true may be seen by referring to Figs. 12, 14, and 20 of my paper. Are we to understand that Dr. Andrews wishes to stake his reputation as a histologist on what he has, by his own confession, *not seen*, in the face of demonstrated and incontrovertible facts? Of course not. His position is not an intentional one at all, but is the result, as I have already stated, of giving too little thought to a somewhat difficult subject.

In Figs. 48, 49, and 50 I have shown how the appearance of blood-vessels in the *stratum intermedium* is brought about. Primarily they have their origin, as Dr. Andrews states, in the connective tissue of the forming jaw. The particular form of this connective tissue, as I remarked in my paper, very closely resembles that of the stellate reticulum, and out of this appearance has probably grown the error of

Heitzmann and his pupils on this point. With the disappearance of the stellate reticulum the connective tissue in which the blood-vessels are developing comes in contact with the *stratum intermedium.* I have shown that at the time when this occurs a remarkable change takes place in the cells of the *stratum intermedium* in the enamel-organ of embryo lambs. Very minute loops of blood-vessels are seen to penetrate the *stratum intermedium*, and about these loops the round or polygonal cells are soon arranged in the form of papiliæ.

It is possible that Dr. Andrews has, for the moment, overlooked the fact that the outer surface of the stellate reticulum is bounded by epithelial cells identical in character with those from which the *stratum intermedium* is developed. With the disappearance of the stellate reticulum these two layers come together and unite. But often before this takes place the secreting papillæ have already commenced to form about capillary loops in the *outer layer* of epithelial cells already mentioned as covering the stellate reticulum. It is possible, and, I think, probable, that the evolution of the secreting papillæ always *begins* in the outer layer, but it is perfectly evident in many of my specimens that after the stellate reticulum disappears, and the outer layer of epithelial cells with the forming blood-vessels comes in contact with the *stratum intermedium*, the cells of both layers are converted into secreting papillæ.

Fig. 50 of my paper shows the formation of papillæ *before* the layers have united, while in Figs. 20, 28, and 42 the blood-vessels may everywhere be seen in the midst of the *stratum intermedium.* The blood-vessels are often seen to lie very near the ameloblasts, but I have never yet seen them in actual contact. This may be seen in Figs. 12, 14, 20, and 28.

Having many specimens which show the appearance I have described, I cannot admit that these points are matters of controversy or opinion. They are demonstrated facts, as shown by the untouched photographs in my paper, and must be dealt with as such.

Coming now to the question of the secretory function of the cells of the *stratum intermedium*, I frankly admit at the outset that somewhat depends upon an interpretation of terms. There certainly is a sense in which every cell is a secreting and excreting organ. But I do not wish to confine my interpretation to so broad a statement as that. The best authorities define secretion as the process by which material is separated from the blood by the agency of the cells of various glands, and by these cells elaborated into new substances. Well, here are the demonstrated facts with regard to the formation of enamel.

Certain substances are required for the formation of the enamel of a developing tooth. The material for one of these substances (that which contains the calcific material) must come from the blood. The ameloblasts do not lie in direct contact with the blood-vessels. The cells of the *stratum intermedium* are not only in direct contact with the blood-vessels, but are often arranged as papillæ about specially formed capillary loops after the manner of recognized secreting cells. *The material for the development of enamel, therefore, must pass through these cells before it reaches the ameloblasts.* Are we not then in a position to say that these cells select from the blood special substances for a special purpose? And does not this essentially constitute the function of secretion? In my paper I stated that the cells of the *stratum intermedium* had *heretofore* been supposed to perform no particular function until the formation of the enamel-prisms was completed, when "*it is believed* they undergo some modification and become calcified as Nasmyth's membrane." The mere casual reader, one would think, could not possibly understand this as an expression of my own opinion, especially when read in connection with the context. And yet Dr. Andrews fastens upon this as the teaching of my paper, and vigorously attacks the very evident man of straw. As one proceeds, his carelessness becomes more and more astounding. Take, for instance, the following: "Dr. Williams say that he is able to show that the cells of the *stratum intermedium* constitute a no less important factor in the formation of enamel than the ameloblasts; indeed, he says it would appear that they are the more active of the two so far as concerns the selection of the proper material for enamel building." (Certainly, I think I have shown that the proof of that statement is as strong as the most evident facts and the most rigorous logic can make it.) And then follows this curiously somnolent passage in Dr. Andrews's criticism: "Again I cannot agree with him. The selection of the material for enamel building, the lime-salts themselves, comes, I believe, directly from the blood-supply everywhere found against the *stratum intermedium* after calcification commences."

A fine opportunity this to make sarcastic merriment, if one were indulging in criticism merely for the sake of being critical. The *selection* of material, he says, for enamel building comes directly from the blood-supply. So far as I can extract any meaning from this, it is that the blood is the active agent in selecting from its own current the material for enamel-building. This is certainly very novel physiological teaching, and suggests the old problem of the man attempting to lift himself over the fence by pulling at his own boot-straps.

I have always understood, as one of the primary principles of physiology, that the selection of material from the blood-supply was the exclusive function of the cells of the various tissues and organs. And following a line of reasoning established upon this generally-accepted idea, it has seemed impossible for me to escape the conclusion that the cells of the *stratum intermedium*, which everywhere surround the capillary loops, select from the blood the material for the elaboration of that albumin-like substance which contains the calcific material for the formation of enamel.

But I suspect that Dr. Andrews objects to this reasonable and very evident function of the cells of the *stratum intermedium* because he had already assigned to them another and very different office. He says, "As I stated in my Chicago paper, I believe that the cells of the *stratum intermedium* are the origin of the fibrous substructure which serves as a scaffolding to build up the young enamel." But here again Dr. Andrews seems very much "mixed," for he adds, "There is a possibility that this fibrous tissue, which I believe I have clearly demonstrated to be present, may originate from the connective tissue of the jaw, which is against this layer; in fact, I have been somewhat in doubt whether or no the cells of the connective tissue of the jaw did not take the place of this layer after calcification had advanced, *for in many sections it is difficult to distinguish anything but connective-tissue cells against the ameloblasts.*" (The italics are mine.)

A few lines farther down the page Dr. Andrews makes the following statement, to which I have already referred:

"I cannot believe Dr. Williams agrees with Heitzmann and Bödecker in their idea that the *stratum intermedium* of the enamel-organ is a kind of connective tissue."

From the above it will be clearly seen that it is not so much Dr. Williams as Dr. Andrews who agrees with Heitzmann and Bödecker. All that I have ever said upon this point is that in the development of the secreting papillæ in the enamel-organ of the mouse there is a stage when the cells of the *stratum intermedium* resemble a kind of connective-tissue cell. But this is merely an appearance probably due to rapid growth and compression at the particular point where they appear.

A little farther on in his address Dr. Andrews asks me a very naïve question. He says, "If the *stratum intermedium*, which is an epithelial product, plays so important a part in the formation of calcoglobulin 'for enamel matrix,' why do we not find the same *stratum intermedium* in the dentine germ, where calcoglobulin is also being constantly formed for dentine matrix?" One might fill a small volume in considering all the points raised by such a question as this. Let not Dr. Andrews make the mistake of supposing that the experiments of Mr. Rainey, Dr. Ord, and Professor Harting have settled the problems of dentine and enamel formation. They are to be accepted for just what they are worth and no more, and they fall a long way short of a complete explanation of the formation of these tissues in a living organism. In my paper I sometimes used the term *calcoglobulin* in speaking of the substance under discussion, but I used the term provisionally and with mental reservations. I also used and preferred the more awkward, but less misleading term, "albuminous-like material."

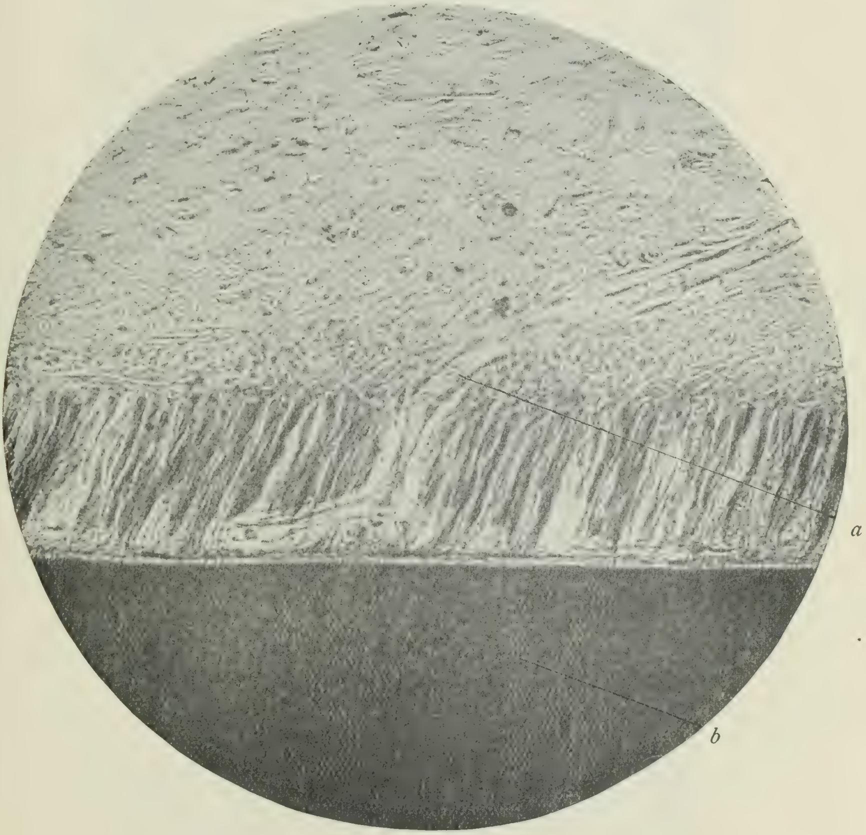
Since the publication of my paper the substance in question has been pretty conclusively shown to be not calcoglobulin.

But to return to Dr. Andrews's question. Why is there not a *stratum intermedium* in the dentine-forming organ for selecting this albumin-like material with its calcific substance from the blood? For the very good and simple reason that this function is performed by the odontoblasts. The subject of my paper was enamel-formation, and not the development of dentine. As I am now engaged in studying the formation of dentine, it would be premature for me to enter at any length upon the discussion of this subject, but at the same time I have no objections to disposing of Dr. Andrews's question. Up to this moment I am not aware that any contribution to this subject has shown or mentioned a most important fact with reference to dentine-formation,—viz, that there is a most intricate and delicate loop arrangement of blood-vessels everywhere penetrating the layer of odontoblasts in a forming tooth. The accompanying illustrations show two phases of the blood-supply to the odontoblasts, and in Fig. 3 the first stage of dentine-formation is beautifully shown. This illustration is a most complete answer to Dr. Andrews's question and a most complete refutation of his position.

We see that the odontoblasts have a free blood-supply and may, in this respect, be compared to the cells of the *stratum intermedium*. We also see them in Fig. 3 throwing out globular masses, of different sizes, of an albumin-like substance just previous to the commencement of calcification.

It is plain, then, that so far as the evidence of dentine-formation has any bearing upon enamel-development we have here a confirmation of the position taken in my paper. (See Figs. 1, 2, 3, and 4.)

FIG. 1.

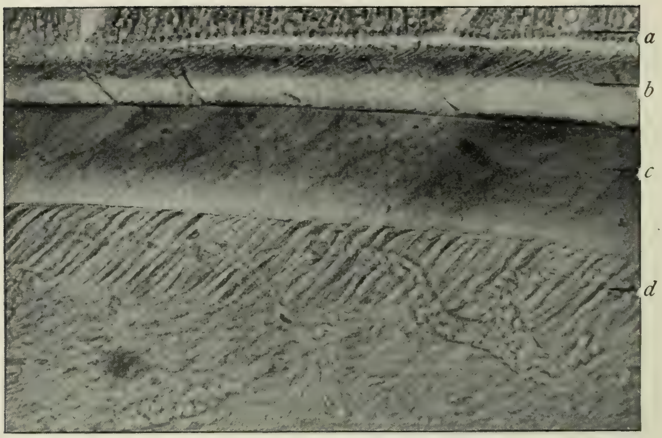


SECTION OF DEVELOPING TOOTH OF RAT.

a, Blood-vessel entering the odontoblastic layer of cells from the pulp; *b*, Dentine.

Up to the time of writing these lines the next statement which Dr. Andrews makes remains a profound mystery. He says, "Dr. Williams is an excellent observer, but he seems to be taking steps into the darkness in this statement: 'the calco-spherites, which I believe to be the only matrix-formers, are but partially formed in the protoplasmic fluids of these cells.'" Here again it is Dr. Andrews, and

FIG. 2.

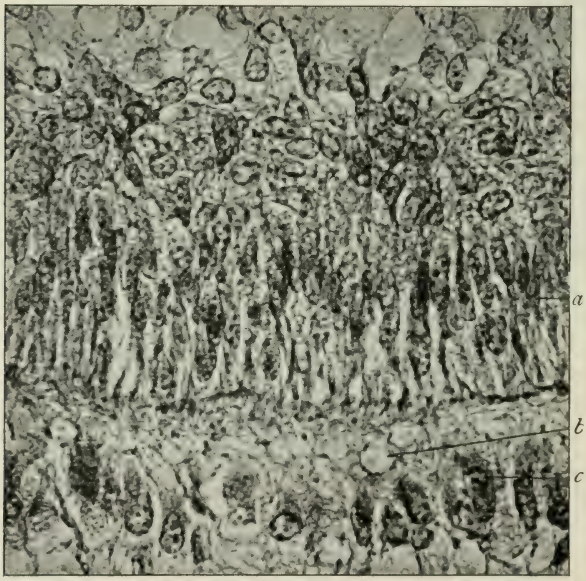


SECTION OF DEVELOPING TOOTH OF MOUSE.

a, Ends of ameloblasts; *b*, Forming enamel; *c*, Dentine; *d*, Distribution of blood-vessels in odontoblastic layer of cells.

A much finer net-work of blood-vessels than is shown here is often seen.

FIG. 3.



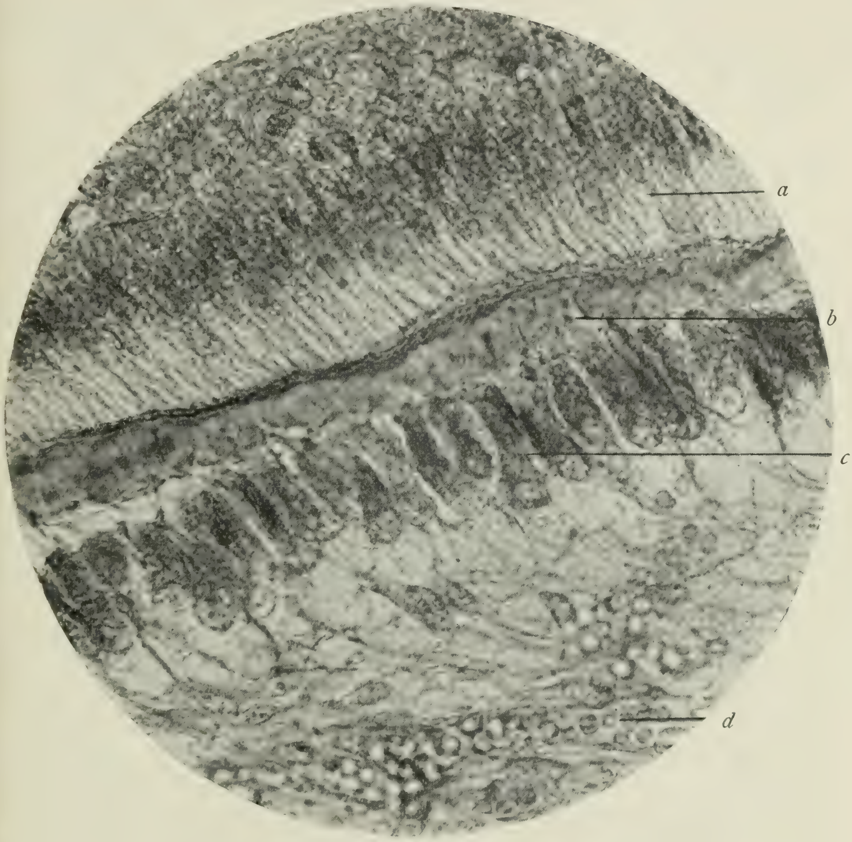
SECTION OF DEVELOPING TOOTH OF EMBRYO CALF.

a, Ameloblasts; *b*, Globular masses of so-called calcoglobulin of different sizes as deposited by the odontoblasts just previous to the commencement of the process of calcification; *c*, Odontoblasts.

not myself, who is wandering in the dark. I have never said or written anything remotely resembling this quotation which he professes to give from my paper, and I have no idea where he discovered it.

Continuing, Dr. Andrews says, "The large masses of calcoglobulin seen in some of Dr. Williams's photographs are, I think, post-mortem changes, where many globules have coalesced, forming the large abnormal masses." "My investigation teaches me that it is probably impossible that there can be two sets of globules, each of a different nature, formed in the enamel-cells, as stated by Dr. Williams." If by "enamel-cells" Dr. Andrews means the ameloblasts, then I have never made any such statement as he attributes to me. I have explicitly stated that the evidence all goes to show that the albumin-like calcific substance is secreted from the blood-vessels by

FIG. 4.



SECTION OF DEVELOPING TOOTH OF EMBRYO CALF.

a, Ameloblasts; *b*, Shows coalescence of the globular masses seen at *b* in Fig. 3, and commencing calcification of the dentine; *c*, Odontoblasts; *d*, Blood-vessels showing corpuscles *in situ*. The natural state of the tissues in all of these specimens is sufficiently demonstrated by the appearance of the blood-corpuscles.

the cells of the stratum intermedium. In the very nature of things the small masses of this substance *must* coalesce in the formation of enamel. But that fact, instead of helping Dr. Andrews in his contention, is one of the strongest evidences against him. Dr. Andrews's mistake lies in supposing that the globular masses seen on the surface of forming enamel are simply due to the presence of what has been called calcoglobulin. These globular bodies are primarily due to the presence of the *globular organic matrix* formed by the ameloblasts.

In the decomposition of completely formed enamel by acids or by the processes of decay, the first part to suffer from the attack is the calcified albumin-like substance which not only fills the interstices between the so-called enamel-prisms, but which, by its complete coalescence, fills the entire organic matrix.

The dissolution of this substance taking place slightly in advance of the more resistant calcified organic matrix leaves this latter substance more clearly revealed than it is in enamel while in its normal state. This is the positive proof that there *are* two distinct products of the enamel-forming organ, and in this proof we find a complete explanation of the appearances figured and described by Heitzmann and his pupils. They have given a purely diagrammatic representation of the organic matrix of the enamel as it appears during the solution of the calcified albumin-like substance, and they have made the ludicrous mistake of supposing that this appearance was due to some organic change in the very substance of the enamel. In a forthcoming paper I shall go into this matter in greater detail.

If in this connection Dr. Andrews will now read that part of my original paper devoted to the structure of completely formed enamel, he will, I think, see clearly how impossible his present position is, and he will also, I believe, be ready to admit that he has been mistaken as to the origin of the fibrous sub-structure of enamel.

A reference to Figs. 63, 70, 71, 72, and 73 of my paper will show him, contrary to a former statement of his, that completely formed enamel-rods show an elaborate structure.

The impression which one usually gets in studying the substructure of the enamel-rods under high power is not at the first that it is fibrous, but that the rods are built up of sections, sometimes globular in shape, and sometimes looking more like sections of a prism, but always having a more or less regular pattern. Looking very carefully, one sees that these sections of the enamel-rods are connected with each other by fibers which pass longitudinally the entire length of the enamel-rod. The fiber is usually not smooth and continuous, but is broken at regular intervals by round granules. In some specimens, as I have already stated, the fiber seems to be almost made up by the successive juxtaposition of these granules. The granules are the points of intersection of the organic matrix, and it is possible that the coarseness or fineness of this matrix may prove to be one of the distinguishing differences between teeth of so-called high quality and those which decay rapidly. The organic matrices of the rods are also often united with each other laterally by processes.

From the point of view of Dr. Andrews and previous observers, that the enamel-rods are structureless, it was easy to conceive of these rods as being formed by the successive deposit of translucent globules of an albumin-like substance containing calcific material. But with the demonstration that the sections of the enamel-rods have a definite structure, and that this structure corresponds perfectly with that of similar sections or globules seen throughout the entire length of the ameloblasts, this theory must be abandoned.

The photographs which I have published show plainly that the origin of all fibers and of all structure seen in the enamel-rod is to be found in the ameloblasts. The cytoplasm of the ameloblast has a definite and fairly constant structure, the differences corresponding perfectly with such differences as may be seen in completely developed enamel-rods. This structure consists of a number (usually four or five) of globular masses of spongioplasm of the same diameter as the cell, and united longitudinally by somewhat coarser plasm-strings. These plasm-strings are the fibers first discovered by Dr. Andrews.

As the organic matrix of the enamel-rod is seen to be built up by the superposition of masses apparently identical with those seen in the ameloblasts, and being, in fact, continuous with them, I assume that we have the most convincing evidence that these globular matrices are successively formed in the ameloblasts. There are many indications that they are formed by the nucleus, and they appear to pass down the cell by the natural process of growth, as new ones are formed above, and to be finally shed off the inner ends of the cells onto the surface of the forming enamel, where they become completely infiltrated with the albumin-like lime-conveying substance and calcified. The fibers which Dr. Andrews describes as passing from the *stratum intermedium* to the ameloblasts are simply plasmic processes uniting the cells. They are seen in many of my specimens, and are particularly well shown in Fig. 44. In my paper I have pointed out that a portion of the plasm-strings of the ameloblasts are sometimes seen, on their emerging from the inner ends of the cells, to turn abruptly to right and left. This is shown in Figs. 52 and 53. It is quite possible that the structures which I have called the inner and outer ameloblastic membrane are formed by the accumulation of the calcific albuminous product of the *stratum intermedium* in the meshes of these plasm-strings which spread out on both ends of the ameloblasts, forming a structure resembling a membrane. This view would explain the identical reaction of these structures to any given stain. The slight accumulation often but not always seen between the ameloblasts and the *stratum intermedium* might be due to an activity of the cells of the *stratum intermedium* for the time beyond the capacity of the ameloblasts to absorb and carry forward the material for the calcification of the enamel. I state this merely as a reasonable speculation in the effort to explain demonstrated facts not before accounted for. The presence of these plasm-strings, which constitute a part of the structure of the cell, also completely explains the fibers which Dr. Andrews has seen on teasing the cells of the enamel-organ apart.

To Dr. Andrews must be given the full credit for having first called attention to the important fact that enamel is not the simple homogeneous substance which it had always been thought to be. His failure to recognize the full significance of his discovery and his errors as to the origin of the organic matrix of enamel arose, I believe, from the use of lenses of insufficient magnifying power.

The use of the very finest optical apparatus, giving an amplification of fifteen hundred to three thousand diameters, is necessary to show all the points I have described; and I might add that something approaching infinite patience is also required in photographing these appearances.

In conclusion, I can only regret that Dr. Andrews had not communicated with me, or at least awaited the complete publication of my paper, before writing his criticism. Such a course would, I think, have maintained that substantial agreement which we have always enjoyed in this work.

But even imperial Jove is said to sometimes nod.

DO WE KNOW ANYTHING OF THE EVOLUTION AND ETIOLOGY OF DENTAL CARIES?

SECOND PAPER.*

BY HENRY GERHART, LEWISBURG, PA.

(Read before the Annual Meeting of the Pennsylvania State Dental Society, July 8, 1896.)

THE thought may come to you that what is here written ought to have been given utterance during the discussion following the reading of my former paper. You must, however, remember that some minds have less immediate resiliency than others; also, that especial allowances must be made for the slower mental operations of one who, from as far back as the days of the Penns, is an unadulterated Pennsylvania Dutchman.

Edward Bellamy said of his book, "Looking Backward," that it was originally conceived and written in a spirit of humor; but when the first draft was finished, he was so impressed by the truth of the underlying principles that he rewrote the entire book and gave it the serious form in which it was presented to the reading public.

Now when, at the urgency of your Executive Committee, the writer undertook to present some of the supposed knowledge which we have on these topics, he confessed his ignorance, and intended to take no position of entire conviction on the correctness or incorrectness of the currently received ideas. When, however, his thoughts were concentrated upon the supposed facts and resultant theories thus currently received, he was compelled to grave doubt of the correctness of some of the conclusions reached by men much more learned than himself.

He consequently felt it to be incumbent on him to enter upon this present brief discussion of some of the points raised by eminent gentlemen at the reading of the former paper, and he hopes they will receive this in the same kind spirit with which they heard the other.

The tentative ideas presented as to the evolution of the teeth, and, as a sequence thereto, of the evolution of caries, were indorsed by the distinguished gentlemen who took part in the discussion; but they did not accept the writer's idea as to the function of the microbe.

---

*The first paper was published in the DENTAL COSMOS for October, 1895, page 832.

The former paper alluded to the continental trend of evolution and the absence from Australasia of many diseases, as stated by Dr. Whitney, who claimed that the oral troubles of which we have knowledge had held sway in the Sandwich Islands long prior to the landing of Captain Cook, and that only after the advent of Europeans zymotic diseases effected a lodgment. Now, if the oral diseases of the Hawaiians were the same as our own, the concomitant bacilli would doubtless be the same, and that, as we shall see, would be remarkable. Dr. Whitney broadly asserts that the oral lesions of these islanders of long ago were the same as those from which we are suffering to-day. He does not say they simulated or were analogous. If they were the same, and superinduced by the same bacilli, then the bacilli must have originated from the same stem, otherwise we would have two independent evolutions of the same thing, the like of which we have not elsewhere.

It is true that analogous environment will develop an analogous organism, but they are never the same. At one time it was thought that this had taken place, when the Rocky Mountain goat was discovered; but anatomical investigation developed the fact that this was no goat at all, not a true Capra, but a differentiated antelope, and that while in appearance it simulated the Capra, there were so many variations that no critical observer would take it for such.

Among the most widely disseminated of animals are the crayfish and earthworm, which probably had their development in that remote period when this globe was encased in an all-pervading fresh-water sea. After the upheaval of continents, and when the streams carried the salts to the sea, the crayfish betook himself to the fresh-water streams, while the worm resorted to moist earth.

To these animals, by reason of their limited scope of locomotion, very circumscribed territories became continental, and we see that the Astacus fluviatilis of Great Britain differs from the Écrevisse of France, and both of these differ from the Flusskrebs of Germany, and will not interbreed when placed in the same waters. All of these again differ from those of America and Tasmania, or anywhere else.

Similar variations are shown by the earthworm.

These facts are gleaned from the exhaustive and lucid monographs of Huxley and Darwin.

Now, if Dr. Whitney has made no mistake, and the theory as to the bacillus is correct, it is very remarkable that the bacilli of the oral lesions stand alone as being evolved in remote Hawaii as in Europe.

Those having faith in the theory of the microbe, to be logical, will claim that every pathological condition is the handiwork of the bacillus. Here naturally will arise the question, What is a pathological condition?

Two of the most learned and distinguished members of this body promised to give me a definition of a pathological condition. They are men whose time is covered by important work, and they may not have been able to spare any for this, or through the pressure of this work the promise may have escaped from their memory. Consequently, with your permission, I will fall back on my own forces.

Herbert Spencer, in his "Data of Ethics," speaks thus of classification: "We may class things together because they are made alike by all having in themselves some peculiarity—some common character. There must be identifiable a common trait."

Upon this basis let me propose the following: A pathological condition is characterized by an involuntary exaltation above or depression below the normal of some functional activity.

If this be accepted, another query lifts its head. Is dental caries a pathological condition? Does it present the one characteristic which attaches to all cases of this class?

It has been conceded that dental caries is made possible because of a non-performance of certain functional acts, and to say that it is itself a perverted functional act would at least be confusing.

Suppose for the nonce it be admitted that dental caries is a pathological condition, then what have we?

It was asserted by Dessault, and corroborated by a large number of other French medical instructors, that all pathological conditions terminate with the death of the body. The natural inference would be that no pathological condition could be superinduced in a dead body. To this proposition of the French scientists no one took any exception; indeed, Professor Litch very forcibly reaffirmed it.

If now dental caries be accorded a position in the rank of the pathological conditions, and that it is brought about by a specific bacillus, we are placed in the very equivocal position of believing that Dr. Miller and others, as claimed by Professor Peirce, have produced a pathological condition in a dead body.

If now it be said that dental caries is not a pathological condition, what then is it? Are we not compelled to concede that the bacillus of Miller is not a bacillus, but a scavenger, capable only of decomposing and living upon that which is already dead, as do the American vulture and the Asiatic marabou, neither of which attack the living except in sorest straits?

Dr. Black, in a recent paper, asserts that the bacillus always influences a zone in advance of its own progress; in other words, like "coming events cast their shadows before." How does he know that this zone is the work of the bacillus?

Let us for a moment consider that new affection which confronts, and, alas! so often confounds, the medical practitioner—Scorbutus Infantilis. The genesis of this lesion has been distinctly traced to the vicious effect which prepared foods have upon the nutrition of children deprived of their natural nourishment, as a result of our artificial life, whereby the maternal fountains are sealed. Is this lesion the handiwork of a specific bacillus that has just now been evolved, or is the microbe, if such there be, simply one which before had its existence, and now finds its habitat, its food, in the vitiated system of the mal-nourished child?

In all candor, is not the latter hypothesis the more reasonable and the one calling for the less explanation?

If we claim that a bacillus caused the lesion of infantile scorbutus, can we say that it also made the prepared foods which brought the child to such a condition that the said bacillus found available nourishment?

To claim that the bacillus brings this serious trouble, which, if neglected, brings death to the child, has to the writer a suspicious appearance of a transposition of *post hoc* and *propter hoc*.

Let us go on a still hunt for a bacillus. A neighbor dies, and the attending physician announces that he died of heart-failure. Is there a bacillus for this? We ask the physician confidentially what caused the heart to fail. He says, "Well, the man suffered from locomotor ataxia." Is there a bacillus for this? If you do not know any more about it than I, we will look into a text-book, and there we find that not only the most frequent, but probably the sole cause or forerunner of locomotor ataxia, is syphilis, suppressed by drugs.

Now, when we look up the history of modern syphilis, we find a curious thing. So many years have elapsed since I read this up that I cannot now give you my authority; but this lesion seems to have taken its rise in Central America, very soon after the discovery of this Western world, as a result of the promiscuous and unbridled intercourse between the native women and men from the Iberian Peninsula. This licentiousness was not a new thing for the Spaniards. Spain was the home of Don Juan. Nor was it to the rest of Europe, for it is related that in an incredibly short time this loathsome disease was spread over the whole of Western Europe, which could not have occurred if there had been anything like general chastity.

This would indicate that it was the coming together of these two widely-varied races that was needed for the development of this disorder. If there be a bacillus for this disease, where did it come from? There seem to me but two ways in which this can be answered. The first is, that it was in existence all the time, but engaged in other business until this lesion was developed, as in the case of infantile scorbutus.

We have instances of similar changes in much higher organisms. Take the kea of New Zealand. Before the introduction of sheep into that country, the kea was a berry-eating bird. With the advent of sheep the berries gradually became less and less plentiful, until these birds began to starve, when they suddenly developed a taste for the kidney-fat of the sheep, and began to kill the sheep in great numbers for this fat alone. Whether this was simply an adaptation to new environment, or, in addition, a return to the type of a raptorial ancestry, I do not know.

The other way in which this question might be answered is by the theory of spontaneous generation,—that is, given certain quantitative and qualitative conditions, you will have a certain kind of life, in which some men of science have faith. I would ask whether these men are not as well entitled to their guess as are others?

Whichever of these two hypotheses we may accept, what becomes of the microbe's initiatory character?

Many years ago, Professor James Truman raised a warning voice against the too copious use of germicides, stating that many germs found in the oral cavity are benign and essential to health. Let me ask, are they not all benign?

If we accept Rentchau's evidence of the amœbic character of the leucocytes, whether vascular or epithelial, and the importance he assigns to the process of phagocytosis, let me also ask whether the profuse employment of germicides may not impair the vitality of these apparently independent organisms?

Let us now take up the Pettenkoffer episode. Professor Peirce directly and Professor Litch inferentially accounted for the immunity on the ground that the most potent factor in that case, and in all others of immunity from the influence of the bacillus, is perfect health. Is this position based upon facts, or is it simply theoretic? When the writer was a young man (fifty years ago), typhoid fever, then comparatively new, invaded his neighborhood, and, to his great surprise, the first to be attacked and those who died in the fewest days were the strong men of health and finest physique, and whose pride was in their superb physical condition. The consensus of the physicians whom I have consulted on this point is entirely in accord with the idea that an epidemic loves a shining mark.

Is it not a fact that, in epidemics, those individuals who are suffering from a chronic lesion of an analogous character are most frequently immune?

We come now to another point, from which Professor Peirce dissented, as to the future evolution of the human teeth. He gave it as his opinion that the human teeth would ultimately be so modified as to be adjusted to the food preparations now in use.

Before accepting a theory like this, let us see what sort of factor human intelligence has been in the evolution of the past. It has been conceded that the mental and physical attributes of man have been influential in bringing about the present state of decadence of man's teeth. It is also well known that human influence is at the bottom of the evolution of the modern horse, ox, sheep, dog, and a host of other lower animals, as well as of much vegetable life.

Ever since the opposible thumb has been developed, the owner of that thumb has had more or less influence over the processes of the world's evolution; and when finally, through the influence of that thumb, the intellect of man was developed, his influence over the evolutionary forces has increased with an ascending ratio, until at this time it may be said, with a good deal of truth, that he dominates the processes of evolution so far as living entities are concerned, and even, in great measure, of the globe itself.

Such being the case, shall he not ultimately also control the evolution of his own denture, as he certainly does every other part of his organism, and be able to restore his teeth to their pristine condition of beauty and usefulness? Shall he not be as well able to restore, through his acquired knowledge, that which in his ignorance and neglect of his powers of observation he has brought so near to utter ruin? In his growing esthetic taste he will inevitably observe what of beauty he has destroyed, and the rising tide of ethical evolution will force him to the effort at restoration.

In closing his remarks, Professor Peirce said that the inferences of the essayist were not in accord with the currently received ideas, which is true. That, however, was the *raison d'être* of the paper, and the only possible excuse for its being read to this body.

A STUDY OF THE RELATION OF THE FRONTAL SINUS TO THE ANTRUM.

BY THOMAS FILLEBROWN, M.D., D.M.D., BOSTON, MASS.

(Read before the American Dental Association, August 5, 1896.)

My attention was especially called to the relation of the frontal sinus to the antrum some four years ago, by difficulties I met with in inducing a cure in several different cases of empyema of the antrum. In each of these cases the frontal sinus was plainly involved, and seemed to be connected with the cause of the antral trouble.

Several of my troublesome cases were sent to me by a specialist in the treatment of the nose and throat, whose skill they had defied for over two years.

I will briefly describe five cases.

Case 1.—Male, age thirty-eight, right antrum affected.

This patient had suffered from rhinitis for a considerable time, and I think the ethmoidal cells were somewhat affected as well as the right frontal sinus. The patient was radically relieved by operation, and the membrane of the antrum made healthy by treatment, except at the foramen as it entered the meatus of the nose.

Case 2.—Male, age forty-two, a dentist.

Offensive discharge from left nostril for nine years.

I found left antrum filled with pus, region of left frontal sinus swollen and somewhat red and sore. He suffered from constant headache.

My treatment immediately relieved him, and he has been able to keep himself entirely comfortable ever since, and has declined operation on the frontal sinus for a radical cure.

Case 3.—Female, age about thirty.

For two years had offensive discharge from left nostril. In this case discomfort almost amounting to pain, and soreness over the left orbit, told plainly of inflammation in the frontal sinus.

Case 4.—Female, age thirty-two.

Right maxillary and frontal sinuses affected.

Case 5.—Female, age thirty.

Right antrum and frontal sinus involved.

These last two cases exhibited essentially the same symptoms as case 3.

Each of these cases I treated by making a good-sized opening through the region of the tooth-sockets, thus affording drainage from the dependent parts of the cavities. In each case teeth had been lost entirely, or only roots remained, as no teeth had to be sacrificed to permit the operations.

Antrum No. 1 was entered through the socket of the second bicuspid ; No. 2, through the second molar region ; in No. 3 the absence of the first bicuspid afforded opportunity ; No. 4 was entered through the sockets of the first molar, and No. 5 through the location of the second molar.

I made the openings as large as a common lead pencil, and made a hard rubber plug attached by a clasp to a neighboring tooth to keep the artificial canal patulous and render the atmospheric condition normal. The plugs could easily be removed by the patient, and, after cleansing, be as readily replaced.

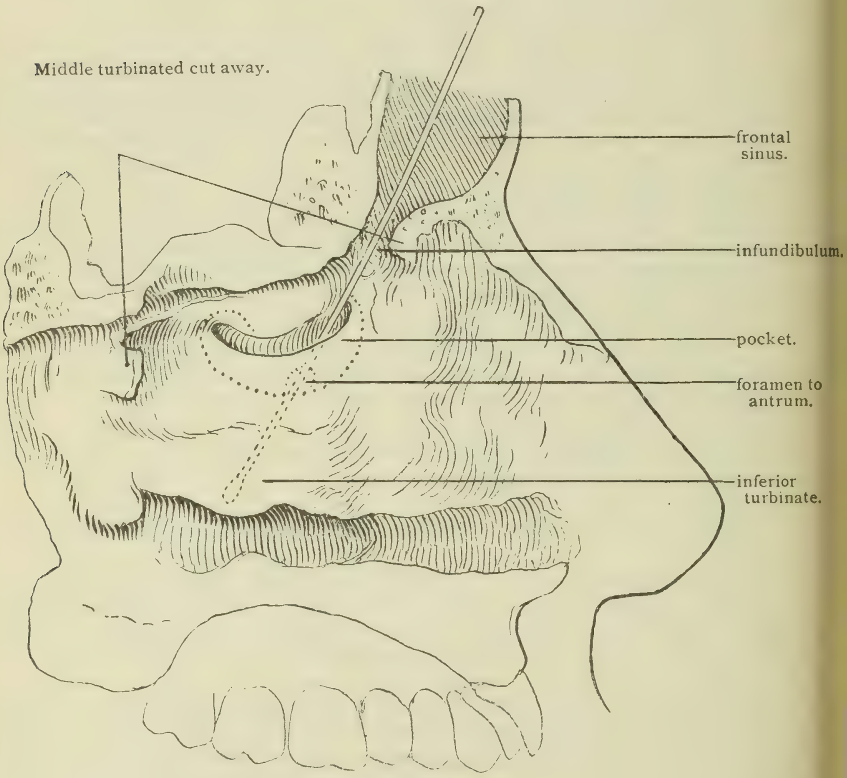
I have tried both the open tube and the solid plug, and much prefer the latter. It is hardly practical to use a canula large enough to syringe through freely and not also to allow the circulation of air, which is not a natural condition.

The plug being easily removed, both plug and cavity can be washed thoroughly clean. A tube cannot be made clean without much difficulty.

The results in the cases I have described are as follows :

No. 3, cured ; has been entirely well for more than a year. No. 5 has steadily gained and is nearly well. No. 4 improved for a year, then sickened and died from other troubles. No. 2, of nine years' standing, keeps himself comfortable, with steady but slow improvement. No. 1 keeps himself comfortable by a daily syringing of the cavity.

FIG. 1.

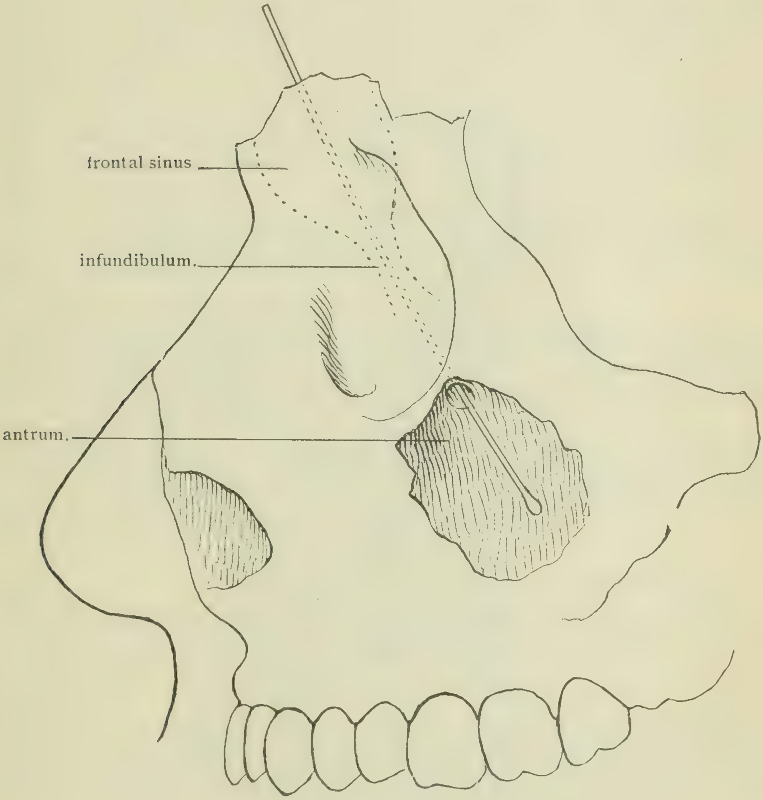


In each case, with a probe wound with cotton, I could explore the whole cavity and locate any pus-producing spots, or any collection of secretions ; and in cases Nos. 1 and 5, by passing the probe through the foramen into the nose, I constantly found pus, which was either secreted at that point or came down from the sinus above. The last I have since found to be entirely probable, as I shall show later.

I have never found any difficulty in inducing a cure of empyema of the antrum in a few weeks, when the cause was of purely dental origin. This being the fact, and the frontal sinus in these cases being so evidently affected, I was led to conclude that there must be a very much more intimate relation between the two cavities than that described by anatomist or surgeon, for I could find neither an anatomist nor a surgeon who could give me the least encouragement that my surmise was correct.

During the past winter I succeeded in verifying my opinion. Professor Dwight, of the Harvard medical faculty, kindly offered me an opportunity to examine several specimens in the Harvard Anatomical Museum, and enabled me to obtain others especially for my purpose, and gave me access to his extensive library.

FIG. 2.

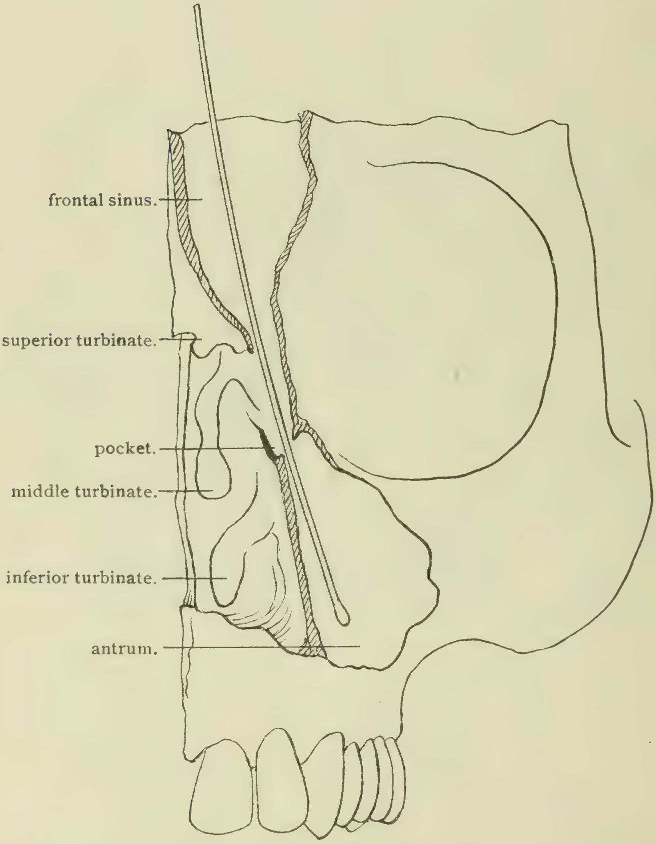


I believed the infundibulum had some direct connection with the antrum and discharged its secretion directly into it, and an examination of eight different specimens showed that to be the case.

The infundibulum, instead of terminating in the middle meatus, continues as a half-tube, this half-tube terminating directly in the foramen of the maxillary sinus. This was the case in all of the eight specimens, and in seven of the specimens there was a fold of mucous membrane which served as a continuation of the unciform process and reached upward, covering the foramen and forming a pocket which effectually prevented any secretion from the frontal sinus getting into the meatus until the antrum and pocket were full to overflowing.

The pocket I have mentioned has been noticed by a few writers, but has been considered by them as an anomaly. If an anomaly, it is remarkable that I should have found it in seven out of eight specimens obtained at random, where the eighth specimen, in which it is absent, is plainly abnormal, as the foramen is very large and very irregular.

FIG. 3.



The continuation of the infundibulum is present in every specimen, and if the pocket is abnormal, my examinations show that it exists often enough to presume it to be present in every case where the frontal sinus is affected in conjunction with the antrum and the discharge from the antrum will not cease.

As I remarked before, few have mentioned the physiological connection of the cavities.

Professor Dwight says, in answer to my request, "I have looked the matter up and am convinced that the infundibulum opens most directly into the antrum, and that the common opening of the two into the middle meatus is practically on the inner side of the infundibulum."

Tillaux points out "that if fluid be injected into the frontal sinus, instead of running into the middle meatus it passes in great part into the antrum;" and Merkle describes a fold of mucous membrane under the common opening, and accounts by this for the occurrence described by Tillaux.

Dr. M. H. Cryer mentions in his valuable paper read before this Association last year, that fluid may enter the antrum from the frontal sinus, but he makes no mention of the intimate connection which I have observed.

Professor Harrison Allen, in a paper published in the DENTAL COSMOS, May, 1895, discusses the proliferation of empyema of the frontal sinus into the antrum, and of the coexistence in these cavities of this condition.

Dr. J. H. Bryan, in a paper published in the Transactions of the American Laryngological Association, 1895, mentions the fact of occasional communication between the two sinuses, but considers them anomalies.

Further than this, I find no mention of this condition.

As the parts so overlie one another it is impossible to show their relations by any series of photographs; hence I present drawings made by Mr. J. W. Emerton from the specimens in my possession, having verified their accuracy.

I trust the attention of anatomists may be given to this subject, and specimens enough may be examined to determine whether the above-described conditions be an anomaly or one of the normal arrangements, and in what proportion of cases it occurs.

TEETH IRREGULARITIES AND THEIR SURGICAL CORRECTION.

BY EUGENE S. TALBOT, M.D.,

Fellow of the Chicago Academy of Medicine.

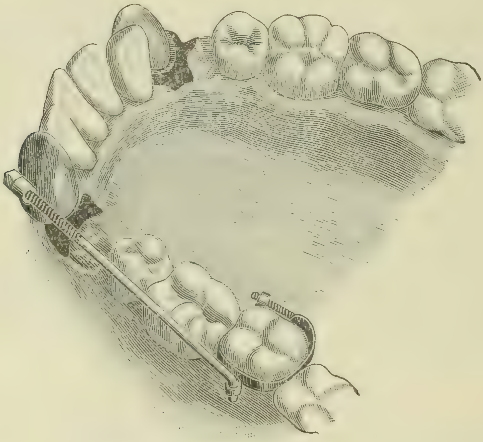
THOSE with experience in the correction of the irregularities of the teeth realize how difficult, tedious, and painful such operations are. Especially is this the case if the patient be advanced in years. Indeed, such operations are often not attempted, because of the density of bone. This is the case especially in hypertrophy of the alveolar process. The inconvenience and unsightly appearance of many appliances required, when great pressure is needed to move certain teeth (notably cuspids, upper and lower) either forward or back, is another objection. Appliances adjusted to the head are so unsightly and embarrassing that not infrequently the patient is deterred from the operation, which would otherwise have been undertaken could some method be adopted which would not detract from personal appearance.

The method of attachment of appliances to the molars for the purpose of moving the cuspids and incisors back frequently chagrins and mortifies the operator when he discovers that, instead of the molars being the fixed point and the cuspids drawn back, the reverse has occurred.

One most difficult problem to solve, which always requires extra pressure, is that when the inferior anterior alveolar process has become excessively developed, carrying the incisors upward until the cutting-edges come in contact with the mucous membrane in the vault of the mouth, which causes proliferation of osteoblasts that carries superior incisors forward.

Density of bone often makes it very difficult to obtain sufficient force to produce the absorption of this tissue required to bring the teeth back into place. Probably one of the most difficult operations is to carry a cuspid, which is erupting in the vault of the mouth, back into its normal position. This not only requires considerable force, but time, to say nothing of the difficulty in attaching a cap for a point of resistance. Rotation of the teeth, especially the incisors and cuspids, is frequently difficult, if not impossible, owing to insufficient leverage.

Fig. 1.



Many other situations present themselves to the operator in his practice other than those mentioned, but as all require treatment in the same manner, only the most difficult cases have been cited. After an appliance has been adjusted, no matter of what nature and pressure applied, the long, tedious method of plowing through the alveolar process (regardless of the density of bone) by absorption is pernicious and unscientific, not to speak of the long, tedious days, weeks, and months of suffering. The period of life most acceptable for the correction of these deformities is between twelve and sixteen years. This time is to the patient the most critical in their lives, and as in every case they are degenerates with an unstable nervous system, the greatest care should be taken not to subject them to great strain. I have known cases of nervous prostration of two years' standing to result, and one case was permanently injured by such nerve-strain.

For seventeen years I have adopted surgical treatment, but have not made public my methods, since incidental conversation with some of the best men from time to time revealed that they had not taken kindly to it. I therefore wished to give it sufficient trial before recommending it to the profession. I have met with such markedly uniform success that I do not hesitate to recommend it to all practitioners as perfectly safe and reliable with the antiseptic care required in surgical operations. This method consists in removing entirely the alveolar process in the line of travel of the tooth to be moved, leaving a small amount of process about the root of the tooth, holding intact the peridental membrane. This is accomplished with coarse-cut Revelation burs, or those that will cut in all directions. They can thus be used as drills in certain conditions to be mentioned later on.

FIG. 2.

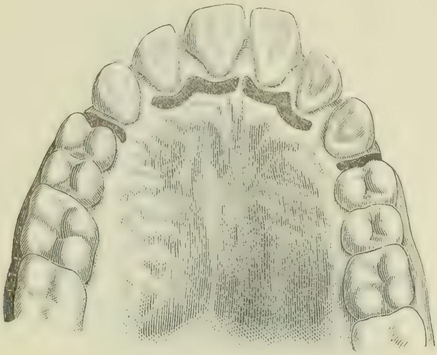
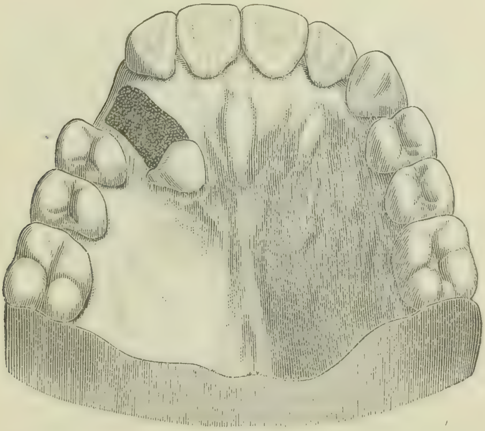
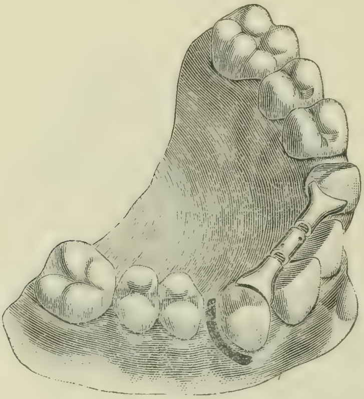


FIG. 3.



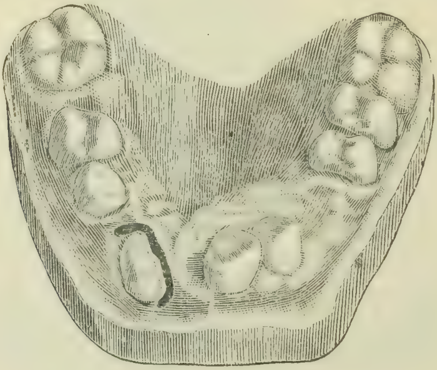
If the cuspids require to be carried backward, make an appliance with bands about the first and second molars, with cap upon the cuspids and a bar with screw and nut upon the end, as recommended by Dr. Farrar. Extract the first bicuspid, and adjust the appliance with a sharp new bur dipped in five per cent. carbolic acid or one per cent. corrosive sublimate or listerine. Then resting the hand against the cuspid, cut out the palatine and buccal V-shaped plate, making a concave surface of the alveolar process, as illustrated in Fig. 1.

FIG. 4.



If the superior incisors are to be carried back, cut semi-circular spaces just posterior to the teeth to be moved (Fig. 2). To carry a cuspid into place which is erupting into the vault of the mouth, remove the alveolar process in the direction of the line of travel. (Fig. 3.)

FIG. 5.



In moving teeth laterally by a jackscrew, it will be found that not infrequently one tooth moves faster than the other. To bring both to their proper position cut out the alveolar process on the side of the slowest-moving tooth, and both will come into proper position (Fig. 4). To rotate a tooth, cut a circular groove as deep as possible around the tooth, leaving enough process to hold the peridental membrane intact (Fig. 5). In this manner teeth may be moved very rapidly and without much pain. This should always be done by means of screws. By this method we have the tooth or teeth to be moved completely under control. Any of the teeth in the mouth may be used for the fixed point of resistance, thus doing away with all unsightly appliances outside the mouth. When in place, they should be anchored in the usual manner. Antiseptic washes should be used from time to time, such as one per cent. corrosive sublimate, listerine, or five per cent. carbolic acid.

In operations of this nature the peridental membrane and also the periosteum are apt to be injured. This was the particular question in recommending it to the profession. Although I have had a few cases of infection, I am quite certain now that such injuries are not of any serious consequence, since with proper precaution no bad results will follow. With this mode of treatment patients are saved time and money, and the operator worry.

THE FUTURE OF AMERICAN DENTISTRY IN EUROPE.

BY DR. ALBAN V. ELLIOTT, PRES. SOCIETA FLORENTINA DENTISTI, FLORENCE, ITALY, AND F.A.D.S.E.

(Read before the American Dental Society of Europe at their meeting in Dresden, 1896.)

MR. PRESIDENT AND BRETHREN:

Before it is in order to do full justice to this subject, let us try to have before us, in a comprehensive way, what is generally understood by the term "American dentistry," its past history and present aspect.

In regard to the first proposition, as to what is meant by the term "American dentistry," I must confess, for my own part, that I do not precisely know, unless we mean by the qualifying adjective dentistry as generally practiced in America, which, if I may be allowed to freely express myself before this modest assembly, means simply good dentistry. Not but that there is good native dentistry in other countries; but, taking the subject as a whole, good dentistry is more general in America than elsewhere. And why? For several reasons. *First*, because of the dentists themselves; *Secondly*, because of the people and their demand for the best; and *Thirdly*, because of the social conditions which obtain in that land of freedom and hustle.

It is not my wish nor intention, neither would it be in good taste, for me to make invidious comparisons. We must recognize the fact that we are, as it were, guests among the people where force of circumstances has placed each one of us. But all the same, with the fullest appreciation of what is due to hospitality, truth is always in order, if not always welcome, and the truth is that modern dentistry, as we now understand it, had its renaissance and its development principally in America. It was in America where the first college for the special study of dentistry as a profession was first established; and I think I shall not be trespassing too much upon the claims of hospitality when I assert that, as a matter of fact, most of the discoveries, methods, and appliances which are now in general use,—such as the saving of pulpless teeth, the rubber-dam, the application of cohesive gold, the dental engine, vulcanizing, artificial crowns, bridge-work, etc., were first introduced, used, and accepted in America. And as this list includes almost everything which characterizes modern dentistry, as we find it to-day, it seems apparent that America is entitled to some especial credit for the part she has played in its development; and those members of the profession in America known as the "Fathers,"—men of brain, energy, and independence,—who contributed so much toward the elevation and popularity of our profession by their industry and enthusiasm, are entitled to the gratitude of the profession for all time to come.

But with all the industry, enthusiasm, and energy with which the "Fathers" were potentially endowed, success could not have crowned their efforts were it not for a reciprocating sentiment on the part of the people themselves to encourage them. After all, the law of demand and supply was an important factor in the evolution. The people demanding a higher order of professional attainments and willing to pay in proportion, the dentist had his ambition stimulated and labored to perfect himself as much as possible, and thus, according to his merits and the confidence imposed upon him, he had an influence over his clients for their good, who rewarded him in return with their faith and good pay. Good remuneration for good work has been an important factor in the process of evolution in dentistry, as it is in that of any other profession, including theology.

Another and important element in the development of modern dentistry in America, which must not be overlooked and which aided the dentist a great deal in his efforts, is the social status of the dentist relatively. In America there are, as yet, no hide-bound crystallized lines of demarkation separating him in a social point of view ftom his client. Socially he is not relegated to a particular social stratum, but, if worthy, is acceptable anywhere. It is the man, not the dentist, which establishes his social status, and, therefore, when in contact with his client he has the courage and the self-confidence to advise and instruct without fear of restraint whenever, in his opinion, advice is necessary. I am talking as an American to Americans, but if any doubt should be in the mind of a hypercritical person in regard to the facts here stated as to the professional status of the dentists in America and the general well-cared for condition of the teeth of the people, let him stand by the chair of any of us practicing in Europe and see for himself the difference between the average American mouth and that of any other nation. And it must be remembered, besides, that the mouths of the people over here with whom we have to do mostly are, as it were, selected mouths, of the higher classes. Here we have the mouth speaking for itself, telling its own story. In the average American mouth, although the teeth themselves are no stronger than are those of other people, we find the gums healthy, the teeth clean and free from tartar; decay, if any, arrested by good fillings, and roots either removed or capped with crowns; and in the mouths of the ladies in particular we almost invariably find that great attention has been given since childhood to keep them in a proper condition. There are exceptions, to be sure, but such are few and far between, and only go to prove the rule.

All classes in America have that feeling of recognition of the importance of the care of the teeth sufficiently strong to overcome the natural repugnance to dental operations.

As there are exceptions to be found among Americans to the general rule of cleanliness, so there are exceptions over here in the other direction, and, when found, such people are usually as careful about their teeth and as willing to pay a good price for good work as the most exacting American. Hence our mission. A people careless, indifferent in regard to their teeth, will not encourage the best efforts of the dentist. With them cheapness and painlessness are the most important qualities to recommend a dentist. Such people usually get what they pay for—which is slovenly dentistry. But in every country and community there are to be found people of refinement and intelligence who welcome and support any improvement over the old and usual standard, and hence the reception and appreciation given to the pioneers of American dentistry who first did missionary work over here, and who at the time of their advent, I think it must now be universally admitted, brought with them a higher standard of dentistry than generally obtained at the time in Europe. Fortunately for us, this advance-guard were not only men well qualified as dentists, but were men of character and education besides. Such men as Abbot, Coffin, Evans, Mason, McDowell, and others similarly endowed, not only obtained a footing and lucrative practices for themselves, but by the excellence of their workmanship and other accomplishments so impressed the cultivated classes among whom it was the lot of each to practice, that the qualifying adjective became synonymous with the highest order of dentistry, and thereby was established a new school, or, rather, a new branch of dentistry known throughout Europe as "American dentistry," to distinguish it from the old. It is a term, however, only known outside of America. In America itself there is naturally no such qualifying expression, because not needed.

It must not be supposed that at the time of the invasion of Europe by the American dentist there was no good dentistry here. There certainly must have been, but not in the same sense or as comprehensive as that the Americans brought over with them. Neither must we suppose that the innovation, as it were, dispossessed the native. On the contrary, it was an advantage to him in many ways by giving him a stimulus to go and do likewise, and *get better fees;* and by the increased attention given to the teeth generally, owing to the renewed interest in the subject, additional work was created and more teeth saved, and the mortality of the people improved somewhat in consequence. Bad teeth, bad digestion; bad digestion, shortened life.

But, as human nature is constituted, it was to be expected that more or less inhospitality on the part of the native toward the innovator would be manifested. It is only in America that the foreigner and his methods are appreciated on their merits and without insular prejudice; because it is only in America that the foreigner abounds in such numbers and is accepted on a footing of perfect equality. But the foreigner in America who takes to dentistry as a profession, to practice it in America, must of necessity—because of the general higher and exacting conditions which obtain there in regard to what is expected of him—be influenced by the pressure of public opinion, and thus he, too, would be as the native American in all that the word implies.

It is not necessary, in my opinion, that a man should be born in America to make him a good dentist. Other things being equal, it is not the birthplace, but the man and the influence of his environment. But other things are *not* equal when we consider the influence of an environment and the exactions of public opinion.

This consideration of the subject is an important one, and should not be lost sight of in dealing with it.

The nature of things, and the fact that so many dentists are taken from the middle or provincial classes and were more or less insular and prejudiced in their ideas, made it only natural that they should resent the encroachments on the part of the foreigner of what they considered to be their vested rights, especially when they found the stranger alienating from them some of their best patients. We must remember in extenuation of their feelings that human nature is more conservative and less liberal on this side of the dividing waters, and should be judged by a different standard.

But while, perhaps, most of the native dentists thus affected were actuated by a hostile and critical spirit, there were others of broader views and more liberal sentiments who recognized that the mission of the American had a power and potency in it which could not be frowned down by a spirit of opposition, and that the only way to meet the invader was with his own weapons,—to meet him on equal terms by going to America and sitting at the feet of the "Fathers," and in this way learn all that could be taught in America, and then to return to their native lands and set themselves up as American dentists,—that is, as practitioners according to the American method.

It is to the credit of many of these students and disciples who were actuated by a conscientious desire for improvement and were willing to go to the expense and travel so far for the sake of the advantages found in America, that they have kept up to the high standard brought with them from America, and have, I have no doubt, been amply rewarded by increased popularity and higher fees. From a broad and liberal point of view their conduct has been considered as a compliment to American dentistry, and appreciated accordingly. As students they have been welcomed and encouraged, and every facility given them while in America to perfect themselves; and, afterward, when in practice for themselves, they have affiliated in a professional and social way with the native American who might perchance be practicing near them. And of course, according to the law of the fitness of things, and in harmony with the spirit of American professional methods, they would in time become active and useful members of our society.

But on the other hand (and now we come to a big but),—but on the other hand, some who have gone to America for the American diploma have not had in view the desire for enlightenment half as much as they had the desire to profit by the good reputation clever men had given to American dentistry. Their object was to get the diploma as quickly and cheaply as possible; and, unfortunately, where there is a demand there will always be a supply, and it was astonishing how rapidly some of these men graduated. Some, even, by their "talents and accomplishments," were awarded "complimentary" diplomas. Others bought "Buchanan" diplomas—I was going to say in open market. At all events, what with the leniency and generosity of some of our colleges and the low market value of bogus diplomas, the good name and reputation of American dentistry must have suffered. As an illustration of the sentiment which actuated these humbugs, I recall what an Englishman whom I met in America confessed to me. He said he did not come to America to learn anything, because, as a matter of fact, he could teach them, the professors, his father and grandfather having been dentists before him. What he wanted was an American diploma, so that he could call himself an American dentist and get American prices, as the American dentist was all the fashion these days.

Understand me, I do not wish to imply that this man was a fair type of those desiring to obtain our degrees any more than was the Anglo-American I met in London afterward who gave me the confidential advice to "do as we do." On asking him what "we" did, he said he extracted every tooth possible, as it saved bother, and plate-work was more profitable than treatment. And yet this man practiced as an "American dentist."

So, after all, what is there in a name? A great deal, sometimes, and that is why we should be so careful ourselves as dentists to do all we individually can, and especially as Americans, to sustain and strengthen the good reputation the missionary fathers obtained for it. It should be to us a trade-mark, so to speak, of the highest value. It is not only the underhanded and fraudulent efforts of some foreigners to palm themselves off as American dentists for selfish and commercial purposes that affect our good name alone. It has also been in danger of being injured by some from our own native land whose ideas and instincts as to what constitutes a gentleman and professional man have been somewhat obscure and not of a high order. Perhaps it is owing to the accident of birth and the absence of early training which gave the commercial instinct a supremacy over the professional with some of these.

It is for us who are serious members of our profession to realize that anything and everything which tends to lower us as a professional body in the estimation of the community is an injury to us individually and collectively.

It is well for us to always remember and have in view the fact that we, as native Americans and strangers, are to a greater or less extent surrounded by hostile influences begotten of jealousy and self-interest. Even many of those having the American diploma, from whom it would be natural to expect sympathy and co-operation, and who are in receipt of the benefits derived from that diploma in a business point of view, are not always hospitable toward us in spirit, but to the contrary. There is none of the American spirit of liberality about them, or, indeed, any sympathy with America or American institutions, but the usual prejudice of an insular people

Whether the dental profession at large in the different countries of Europe gives us the credit for it or not, the fact is that through the efforts of the American to raise the standard they too have been lifted up and their position socially and professionally improved. It is the "little leaven which has leavened the whole lump."

We have reason to be proud of the fact that our mission is an honorable one, and has been for the good of humanity. We have come not to destroy, but to *improve.* We have come not to *lower* the standard, but to *raise* it. We have come not to establish *lower* fees, but to encourage good work by demanding commensurate remuneration for it. And, in every way, it seems to me that it must be admitted that all classes have been benefited by the coming of the American, and none more so than the profession of dentistry at large.

Our society, as a society collectively, and individually as members, has done much to sustain the good name and reputation of American dentistry. And I think I am privileged to say, without incurring the charge of boasting, that as a body, and as individuals, we have no reason to be ashamed of ourselves. Some of the most important discoveries and methods to which the profession and society are indebted have emanated from its deliberations and have been published to the world by its transactions.

To make a forecast of the future is always, owing to our limitations, a difficult matter. Reasoning by analogy is well, so far as it goes, and with its help I think I can see the "handwriting on the wall," which does not say that so-called American dentistry has been tried and found wanting, but to the contrary. But it does say that there is a future for it in Europe, though not, perhaps, in the same sense as formerly. The seed has been well planted and taken firm root. The methods and appliances which were recognized in the first place as distinctively American are now public property and in general use in the profession. And we must take into consideration the fact that the combined influences of ambition, jealousy, and the inclination for higher fees has stimulated the whole profession of dentistry throughout Europe toward a higher standard. In every country laws have been enacted regulating and restricting the practice of dentistry, partly, perhaps, as a means to limit the inrush of Americans and the obtaining by them of the best "seats in the synagogue." Whatever their object, whether just or unjust, justified or not, it is their own affair, and we, as strangers, have no other alternative but to submit.

In the mean time, as I said before, the seed has been well planted, and plenty of good fruit will be the result. And if the native American dentist of the future may not be allowed to practice in competition with the native on this side, the native himself has this advantage, that in his case there is nothing to hinder his going to America and profiting thereby. He may, in his pride, feel that he is no longer in need of instruction from the fountain-head. But judging from the appearance of the mouths of some of their best people which are presented to us daily, he has a tremendous "order to file" before he can bring them up to the average standard as it exists to-day in America. Will he do it? Are the conditions favorable for his best efforts? These are delicate questions which time alone can answer.

I think I am safe in saying that as far as we native Americans here assembled are concerned, we wish them "God-speed." With us there are no jealousies toward our confrères on this side. In fact, I believe I voice the sentiment of all the Americans present by saying that in proportion as a man is worthy, whether "Jew or Gentile," Greek or Agnostic, he is welcomed into full fellowship among us, and that, too, without reservation. I am happy to say that as far as I am personally concerned, meeting as I do the American dentist, not a native, on neutral ground, as in Italy, my relations with them, both professionally and socially, have always been most cordial and confidential.

Owing to the practically prohibitory laws in force in the different countries of Europe, the native American will be in time eliminated and his place taken by the educated native, unless in exceptional cases, where he could somehow manage to evade the law or was willing and able to accept the conditions prescribed by the laws governing the practice in each country. But, although the place which knew him once and appreciated his worth may not know him, personally, any more forever, yet his work and his influence, as long as America continues to lead the van in all that pertains to progress in dentistry, will be felt, even if no credit is given him.

I have faith in the future evolution and development of dentistry in Europe. But I have still more faith that America will continue to lead, as in the past, in all things that relate to progress in dentistry, because of the law of least resistance being more potent there and the conditions more favorable.

TEMPERAMENTS IN DENTISTRY.

BY J. P. GRAY, M.D., D.D.S., NASHVILLE, TENN.

(Read before the Tennessee State Dental Association at Nashville, Tenn.)

NOTWITHSTANDING the recognition of the temperamental factor in human development even during the earliest days of medicine, there is very little literature upon the subject now.

Our knowledge has progressed but slightly beyond that of Hippocrates and his immediate successors. Medical men of all ages have recognized the importance of temperament, but, strange to say, so far, have made very little effort toward developing the subject, explaining its underlying causes and the part it plays in directing pathological processes, and influencing treatment.

There is so little written upon the subject that it has been impossible for me to obtain that data and knowledge I had desired. I owe largely what little thought I have to an article which appeared in the DENTAL COSMOS a number of years ago by that eminent teacher and philospher, Dr. White; and that I may give you a clear idea of what is meant by temperament, will make the following quotation :

Dr. White says, "Temperament may be defined as a constitutional organization, depending primarily upon heredity (ancestral or acquired), and consisting chiefly of a certain relative proportion of the mechanical, nutritive, and nervous systems, and the relative energy of the various functions of the body,—the reciprocal action of the digestive, respiratory, circulatory, and nervous systems. The stomach, liver, lungs, heart, and brain—digestion, assimilation, respiration, circulation, and innervation—are all factors in the differentiation of temperaments, and according to the congenital predominance of one or the other, and the relative activity of these functions, is the modification of the characteristics of the individual which assigns him to one or the other of the basal, or mixed, temperaments. Each temperament is the result, as well as the indication, of the preponderance of one of these systems and of the relative functional activity."

Temperament may be defined, while roughly, yet briefly, by saying that it is a normal bodily peculiarity, with associated mental characteristics, belonging to classes of individuals. I say normal, since were it abnormal, it would become a diathesis, if not a disease. Temperaments are natural conditions of the body which cannot be separated from any conception of the human race.

In contradistinction to idiosyncrasy, I would say that temperament refers to the peculiarities that belong to classes of individuals, while idiosyncrasy refers to the peculiarities belonging to separate individuals. Again, the physical peculiarities in temperament are recognizable ; in idiosyncrasy they are not. In temperament there are always characteristic physical and mental manifestations ; in idiosyncrasy there are none.

For simplicity in discussion, as well as in study, I shall follow one of the oldest classifications we have,—one, too, by the way, upon which there has been very little improvement. I will discuss temperaments under four heads,—the sanguineous, bilious, nervous, and lymphatic. From various and complex combinations of these four which I will denominate basal temperaments, we may have many others, such as the nervo-sanguineous, the sanguino-bilious, etc.

Not only may we have any two combined, but three or all, in ever-varying proportions, may enter into the constitution of one individual. In such a combination, one or the other of the basal temperaments will be found predominating. Not always, however, is it easy to recognize the predominating one. Dr. White says, "It is difficult, in some cases, to decide positively to which variety a special case belongs, the several temperaments being combined and blended in such ever-varying proportions. Not infrequently the indications are contradictory, and the blending of several temperaments requires a nice discrimination to define the admixture."

The various basal temperaments are recognized by certain bodily conformations and physical and mental manifestations. In the sanguineous the heart and blood-vessels are found predominating, both in structure and in energy. The pulse is strong, frequent, and regular. The complexion is florid and the countenance animated. The flesh is firm and stature erect. They are lively and luxuriant, of a quick perception, and a passionate disposition, ardent and daring, but inconstant and changeable.

The nervous are usually of slender form, with a small, soft, and wasted muscle. They possess vivacity of sensation, promptitude, but fickleness of determination. In them an unrestrained nervous system predominates over all. The hysterical woman is a fit illustration of this class.

The bilious are supposed to have an over-acting liver, with a well-developed sanguinous system. Their pulse is strong and hard, the skin brownish with a tendency to yellowness, and the hair dark. The body is moderately fleshy, the muscles firm, and figure expressive. "They possess hardihood in the conception of a project, steadiness and inflexibility in its pursuit, and an indefatigable perseverance in its execution."

The lymphatic have soft flesh, flaxen or fair hair, a weak, slow pulse, and a plump figure, but without expression. They lack tonicity of tissue, steadiness of attention, and reliability of memory.

These are some of the many physical and mental peculiarities usually recognized as signifying temperament.

As a dentist in the profession of medicine, I want to suggest other peculiar physical conditions, valuable in deciphering temperament, and insist upon the importance of their recognition by the dental surgeon.

It is an established fact that the nutrition of the teeth depends upon the nutrition of the organism at large, and that, after a prolonged serious illness, previously perfect teeth will show signs of disease and early decay. How often is it, after a severe typhoid fever, our patron who, before the attack, had perfectly sound teeth, comes to us with a necrotic area on numbers of his teeth, and it may be many such areas on one tooth. Not only will there be caries, but the whole tooth-structure will be impaired, and not until after a complete convalescence of the patient will its former integrity be regained. This shows the intimate relation existing between the life, growth, and nutrition of the tooth and the general system. Frequent child-bearing, prolonged lactation, wasting disease, and constitutional taints, all are great determining factors in modifying tooth integrity.

Not only is the integrity of the tooth modified by constitutional diseases, but its character by the constitutional structure of the individual or his temperament.

In the sanguineous we find the cream-yellow tooth, with a tendency to translucency. They are well proportioned, and abound in curved or rounded outlines. Their surfaces are smooth and possessed of a fine degree of brilliancy.

In the bilious they are large and inclined to be angular, rather long in proportion to breadth, bronze-yellow in color, and have neither brilliancy nor transparency, but slight translucency.

In the nervous they are of a fine pearl-blue or gray color, with length predominating over breadth, and have fine long cutting-edges and cusps.

In the lymphatic they are large, but not shapely, with breadth predominating over length ; their cusps are poorly defined, and their finish dead or opaque, even to the cutting-edges.

Such are some of the characteristics, as recognizable by the eye, of the teeth of individuals of different temperaments.

But are we to conclude that these physical appearances are the only ones to be found distinguishing temperament? Certainly not. If the sanguineous, bilious, nervous, and lymphatic possess relative differences of the muscular, nervous, vascular, digestive, excretory, and respiratory systems ; if they differ as regards shape, size, complexion, and endurance ; if they present different mental characteristics, and if the functional activity of all the systems of the organisms partakes of the temperament of the individual in which they exist,—why not conclude that the histological structure of all these parts is also modified by the temperament of the individual? These histological differences, while they cannot be free from a difference in the kind of elementary or molecular substance which enters into the structure of the different tissues, yet it can consist of different proportions and arrangement of them ; and if histological differences are found here, why not in the teeth, these organs that characterize temperament more than any other in the body?

I believe that the close-observing dentist can oftentimes classify temperaments by the teeth when all other indications are contradictory and confusing.

As an illustration of the histological differences in teeth of individuals of different temperaments, let us compare the tooth of the lymphatic with that of the nervous. In the former we have, besides the differences already referred to, a large apical foramen, with irregular tubuli. In the latter the apical foramen is small and the tubuli are regular. The wisdom of this arrangement is very simple and interesting when we take into consideration that in one the actions of the heart and nerve-centers are sluggish and require a larger opening, that they may more freely act upon the tooth-substance. In the other the opposite obtains. Depending upon this anatomical difference there is another difference. In the tooth of the lymphatic individual a greater irritation is necessary to excite a given inflammation than in the tooth of the nervous, and a greater amount of inflammation is necessary to produce strangulation.

Now, if these anatomical differences mentioned modify the conditions spoken of, and if, again, the general practitioner recognizes that the sanguineous is predisposed to high temperature in his ailments, the lymphatic to adynamia, the bilious to digestive troubles, and the nervous to restlessness and delirium, is it not fair to conclude that temperament is also a factor in determining pathological processes of dental lesions?

Different temperaments are accompanied by different histological arrangement or structure of the tissues ; and differences in histology cause a difference in pathological processes ; and a difference in pathology calls for different therapeusis.

All of us have seen arsenious acid, when placed upon the live pulp of one tooth, produce the severest pain, and when upon that of another alleviate the pain present. In pericementitis and pulpitis we frequently find that the agent which relieves in one case aggravates in another.

But, so far, we have spoken of the teeth as we would find them in an individual of a pure, simple, and unmodified temperament. Such a one we rarely, if ever, see. I hold that the dentist can recognize by the teeth not only an unmodified temperament, but the various and complex combinations that may exist in any one person. While the complexion and the build of a patient, the profile of his face, may have lost their characteristic significance from the combinations of several temperaments, the teeth are always expressive, and by a close study of their physical differences we are able to name the various temperaments of the combination. In such a person we will observe a certain number of teeth partaking of the characteristics of one temperament and others of another. and so on, representing the whole of the combination. As an illustration, in the mouth of the nervo-sanguineous we will have a certain number of teeth of the sanguineous and the remainder of the nervous type. One tooth may be of one class and the adjacent one of another.

But, after all, is this so different from the state of affairs as recognized in other portions of the body? We all see daily, and, in fact, in nearly every person we meet, such a combination of physical features. How often is it that we see the stature of the sanguineous with the complexion of the lymphatic, and the build of the nervous with the tenacity of purpose of the bilious, and so on through the whole list of temperamental characteristics. We oftentimes see in an individual the characteristic features of all the temperaments: the eye of the bilious, the complexion of the sanguineous, the build of the nervous, and the expression of the lymphatic. Just so with the teeth, some partaking of one and others of another temperament. If this is so, how necessary then is it that we be alert to the demands upon us. "What is one man's meat is another's poison," and what is curative to one tooth may be aggravating to its fellow. This is a subject about which there is as yet but little known, but from which I verily believe may be had many valuable facts when properly studied. It is one that, when more fully mastered, will remove many uncertainties from our professional efforts, relieve us of much anxiety in our labors, and place us far on the road of scientific dentistry.

But shall I stop here? I would indeed feel derelict in my duty were I to fail to mention, at least, the importance of its recognition in prosthetic work. Think of a dentist introducing the massive tooth of the bilious into the mouth of the nervous, and the long slender tooth of the nervous into that of the sanguineous. It is essential to restore function to the edentulous mouth and secure comfort and usefulness, yet it is also important that a correlation of the substitutes to the physical characteristics of the patient be not lost sight of. Again quoting from Dr. White, "The first study of the dentist who aspires to the dignity of artist, when professing to replace lost dentures, should be to restore the natural appearance of his patient; and this can only be effected through an appreciation and observance of the temperamental characteristics and the law of correspondence or harmony.

"Age and sex may somewhat modify the requirements in a given case, but the basal fact upon which he should proceed is temperament. A failure to recognize its demands will result in a failure from an esthetic standpoint. A knowledge of the distinguishing characteristics of the various temperaments and the style of teeth which conform to nature's types in the physical organization marks the difference between the dental mechanic and the dental artist."

◆

PROCEEDINGS OF SOCIETIES.

PENNSYLVANIA STATE DENTAL SOCIETY.

THE twenty-eighth annual meeting of the Pennsylvania State Dental Society was held at Bellefonte, Pa., July 7, 8, 9, 1896.

The meeting was called to order at 11 A.M. by the president, Dr. E. C. Kirk, and was opened with prayer by Rev. J. W. Gray, of Bellefonte, after which an address of welcome was made by His Excellency Daniel H. Hastings, Governor of the State of Pennsylvania, which was responded to by the president of the society.

The president then read his annual address, which dealt particularly with the principles underlying the proposed new dental law of Pennsylvania.

The subject was briefly and favorably discussed by Dr. C. N. Peirce and Dr. Henry Gerhart.

At the afternoon session the proposed new dental law was discussed and amended by sections, and as finally adopted was referred to the committee having it in charge, with full power to amend or alter as might be found necessary, in order to secure its passage by the coming meeting of the state legislature.

The new by-laws were discussed and amended by sections at the evening session, and as finally amended were adopted as a whole.

A paper, entitled "Do we Know Anything of the Evolution and Etiology of Dental Caries?" (second paper), was then read by HENRY GERHART, D.D.S., of Lewisburg, Pa.*

Discussion.

Dr. C. N. PEIRCE. I want to congratulate the essayist upon his interesting paper; but when he assumes that certain micro-organisms do not indicate or produce from their presence certain impressions upon the body, I think he assumes more than can be sustained.

We have, I think, definitely recognized two classes of bacteria,—the pathogenic, producing disease, and as sub-classes the zymogenic, producing fermentation; also the chromogenic, producing color. Nearly all are embraced in these classes. Now, I don't think the essayist can at all dispute the fact that we cannot have fermentation without certain micro-organisms in the solution that ferments. It is impossible. The matter has been tried time and again. What is the utility in using our antiseptics but to free matter from fermentation, if it is not a fact that the micro-organisms instrumental in producing fermentation have been prevented from multiplying and having their influence? Every one familiar with the canning of fruit knows the utility of cementing the jars of fruit after it has been canned. And what for? Simply that the germs in that liquid or fruit are destroyed, and access of the germs to the fruit from the outside is prevented by cementing, so that the fruit does not ferment.

The preservation of fruit by canning is one of the best illustrations of the influence of germs, and it is done in such a wholesale manner that every one in the world is receiving more or less benefit from the recognition of the fact that by the exclusion of the micro-organisms of the fruit it does not ferment.

The allusions of the essayist to micro-organisms dropping into one at one time and another, producing diphtheria in one case and in another typhoid fever, is no argument that the micro-organism is absent in those cases. It produces one or the other disease, simply owing to the condition of the individual. It does not follow that every one would take typhoid fever because he comes in contact with that individual microbe. Thousands of persons are daily exposed to it, yet they don't take typhoid fever, because the system is not in a condition to give a habitat to that particular micro-organism, and the same with diphtheria or phthisis. I would not be afraid to occupy a room for a year with a man who had consumption. I did it for a year when I was a young man, but had no fear of phthisis, and had no fear because I was not so organized as to be affected by its influence, while thousands of persons occupying the room one-half of that time would probably have been infected with the disease. But because one person is affected and another is not is no argument that the micro-organism does not have some influence in producing these diseases. The micro-organism is the cause of a certain condition and not the result, but another certain condition must exist before it has its influence.

---

* Dr. Gerhart's paper is printed in full at page 898 of this issue.

Now, he used the illustration of the modification of the horse through the civilization of man. The horse has been modified, but owing to cosmic influences the changes or conditions surrounding the horse changed it to the present horse. Going back, we find five or six different grades or modifications from the single toe to two, three, four, and five toes, and all these changes are produced by the difference of environment that they found on the plains, and not through man's influence at all. The horse we have to-day, with a single toe, was not the result of any contact with man, but it has been the result of cosmic influences that surrounded the species.

I think no one would claim that gunshot wounds are caused by micro-organisms, but surgery has proven beyond a doubt that if you can exclude from that wound the micro-organisms you have a chance of healing in half the time, and with half the injurious influences upon the system of the individual receiving the wound. See what we have every day of the year. Look at the operations performed upon patients in the hospitals of Philadelphia and other large cities, where tumors are removed and organs of the body formerly considered essential to life are taken out and the patient kept quiet for a few weeks and health is regained, while previous to antiseptic surgery four-fifths of such cases died, and now not one-fifth, and all due to antiseptics and care and influences thrown around the patient during the operation. I have in the last two or three years witnessed some surgical operations that seemed almost impossible, so serious that the patient for an hour afterward scarcely showed signs of life at all, being kept alive by injections of salt water for an hour or two afterward. Now they are good, healthy persons. That could not have been possible before antiseptic surgery was practiced. Such operations would not have been attempted, and it is only because surgery has learned to control the influence of micro-organisms that such operations have proved successful.

I think there is more difference in the view taken of the subject than of the facts, and I think the essayist has given his attention to one little matter of fermentation alone. If you exclude the micro-organisms producing it, you can't have fermentation. You can't turn your cider into vinegar if you boil the cider and bottle it from the atmosphere. You can't turn sweet milk into sour milk if you place it in such a condition that micro-organisms cannot come in contact with it. It is through the influence of micro-organisms that the change takes place.

Dr. THOS. C. STELLWAGEN. I have long felt that in the study of bacteriology we would be benefited, but at the same time have hesitated to go to the extremes which have been taught and followed. It would be a delightful thing if we could feel satisfied in our own minds that it is only necessary to discover the bacillus or microbe of each and every disease and then proceed, by some means or other, to treat it as we have treated the potato bug and various other bugs.

There undoubtedly are diseases which are the result of these low forms of growth. There are, undoubtedly, certain of the low forms of life that, after they have once had their germination, continue to increase, and seemingly increase indefinitely.

We can also understand that there is back of all this the necessity of something which, in connection with agriculture, we call climate and soil. You all know that rhubarb, for instance, is best, I believe, when grown in Turkey ; that there are certain climates suitable for certain kinds of fruits. The tropical climate has its fruit ; the temperate climate has its own, etc. I was told by my friend Dr. Hayes, some two or three years ago, after he returned from one of his Arctic expeditions, that one of the most interesting things to him was the vast forests of willows which he saw, which did not grow much higher than ordinary grass, if I understood him correctly,—six or eight inches high, yet a true willow-tree. Difference in climate had made a difference in the height and the growth and development of it.

Now, understanding that difference, you can understand why it is that certain of these microbes flourish in soil which is suitable for them, in a temperature or climate that is suited to them ; but that all diseases are the result of these microbes, I very much doubt. I am inclined to think, in a great many cases, they are a product of the peculiar condition rather than the cause of that peculiar condition, and that without some change first taking place in the organism the microbe would not flourish. Take the maggot : unless there is something for it to flourish on, we won't find it.

In attempting to overcome these microbic growths, we have got to consider the important factor of keeping the body in such a healthy condition that it will, of its own accord, prevent or clear off the growth, or prevent its becoming so great as to produce disease.

Therefore I don't feel as some do. I recollect one of my personal friends who had one of the finest sets of teeth I ever had under my care, and yet in his mouth for some months, nearly every day, and sometimes twice a day, examinations were made of the oral fluids by Professor Holman, and it was found always to abound in various forms of growths. I have seen them numbers of times. He had systematic examinations made day after day, yet I don't recollect a single patient who had less dental caries, or less trouble to abate it when he did have it, than this one patient.

This, of course, does not prove anything. I simply look at it that the middle course I think you will find eventually will be the course that will prove most satisfactory ; that is, between the extreme bacteriologist on the one hand, and that of absolutely ignoring all the effects or influences that these organisms may produce on the other.

Pasteur, you know it is said and believed, had effected a cure for rabies, yet it is very gravely doubted, and it has been recently discussed by some of our leading physicians, whether there is such a disease as rabies, or, if it does occur, whether it is not so rare as to be practically hardly worthy of consideration. If the statistics are not wrong, more people died after Pasteur's introduction of his cure in France than had previously died in all Europe. Pasteur, I am told, never ate a meal without having everything disinfected, sterilized,—napkins, plates, knives, forks, spoons, everything, were brought piping hot to him out of the oven, sterilized, etc.,—yet it did not, apparently, prolong his life beyond the average life of man.

Another point, then, that I want to make is that we do not allow ourselves to be carried away by these ideas to such an extent that we will be disappointed or disheartened if we don't find that the mastery of the subject of the growth of bacteria will put us exactly in the position of controlling all disease. I think there are many diseases which bacteriologists will never be able to explain from their own individual outlook. That it will be a benefit no one can doubt; that it will advance and improve our knowledge I haven't a question; but I think it is at present, in a great many cases, almost, I might say, a scientific fad. It approaches to that point in a great many cases.

Dr. W. F. LITCH. The paper we have just heard is one out of a hundred, and I was very much interested in it. I will only say a few words in discussing it. The ground, I think, has been pretty well covered by Drs. Peirce and Stellwagen. I fully agree with all they have said, especially Dr. Stellwagen, in thinking that the bacteriologist is disposed to carry his specialty rather too far.

There are many diseases for which bacteriological origin is claimed which, I am satisfied, are entirely independent of any such influence. But such over-zealousness is naturally associated with new ideas, and there are always enthusiasts in every cause who do it harm rather than good by their undue zeal. The science of bacteriology has been no exception to that very general law.

The fact that many diseases are due to bacterial origin is, I think, beyond all cavil. The immense class of zymotic diseases must be. Take the disease of smallpox, for example. There is nothing more definitely determined than that it must be of bacterial germination. We are able to make cultures of the germ, and through this discovery the world has been saved an immense amount of pain and disfigurement.

Dr. STELLWAGEN. There is one point escaped me, and that is this: Some months since I was taken through an operating-room where the outfit had cost thousands of dollars, and after I walked through that room the idea occurred to me, if this style of surgery is to prevail, it will be a splendid thing for those men who can afford to put in such an outfit, and absolutely shut the door to everybody else. I have seen a great deal of surgery where just the reverse condition held: where there seemed to be almost reckless carelessness about sterilization and all that sort of thing. The costly room would have shut out nearly every operator in surgery, and left the field practically alone to him; but, unfortunately for him, he lost more patients than the careless operator did. This is not an argument in favor of carelessness, but I allude to it merely to emphasize the undesirability of running to extremes in surgery as in other matters.

Discussion closed.

(To be continued.)

SOUTHERN DENTAL ASSOCIATION.

(Continued from page 860.)

SECOND DAY—*Afternoon Session.*

AFTER the transaction of routine business, the chairman of the Committee on Oral Clinics introduced Dr. S. W. FOSTER, who gave a clinical lecture, exhibiting the patient, and the appliance illustrated and described by Dr. Hinman at page 559, July issue DENTAL COSMOS, 1896.

He said, I am especially interested in this case, as I saw it from inception to completion, and consider it something wonderful in the results accomplished, in the improvement in the appearance of the patient, in his comfort, and especially in the restoration of the power of articulate speech, for, as you will see, without the appliance constructed by Dr. Hinman you cannot understand what he says, while with it in position his speech is almost normal.

Dr. Luckie next introduced Dr. J. Y. CRAWFORD, who gave a clinical lecture, diagnosing a case presented.

He said, The case presents semi- or half-prognathous features—semi rather than complete. To decide upon the treatment required to modify that condition would require more prolonged consideration than we can give the case now. We also find local gum trouble,—hypertrophy of the gum,—sometimes mistaken for hypertrophy of the alveolar process. This is acute, depending upon strangulation and requiring removal of the cause,—large deposits of tartar which interfere with the circulation, inducing a condition of hyperplasia. All these stumps of teeth and all these baby teeth should be removed. I am often asked, "What do you do with baby teeth that have been too long retained?" I say, "Always take them out." This is the result of clinical observation. Always take them out! It is the rule of nature that there are twenty teeth to be shed and be replaced. If they remain in place beyond their normal time, pull them out. But, you say, perhaps the permanent teeth will never erupt. In forty-nine out of fifty cases they will erupt, and you don't want to sacrifice the forty-nine chances for the sake of that other one. Remove them at approximately the proper age for them to be removed by nature. Not according to the old tables of eruption, however, for the time is being gradually retarded through the influence of our faulty systems of education and diet. The teeth of American children do not erupt according to rule, but the time is growing later and later. In the present case, after the removal of tartar, of stumps, and of baby teeth, and the treatment of the gums, make him clean his mouth. And a word right here of clinical importance of which you can make a test in your operative procedures. Why do the teeth of the American human family decay as they do? Because they do not know how to cleanse the oral cavity. Give your patient a glass of water and tell him to rinse his mouth. He will sip it daintily and spit it out as if afraid of it, and you will find that he has not washed out the blood or pumice-stone, or other débris.

Give him a new brush, and still he will not get the blood and pumice-stone out. Teach your patients how to irrigate the oral cavity, throwing the head well back. Why use pumice-stone, polishing powders, etc.? They only injure the gums. Water is nature's great remedy; make them pass the water through the interdental spaces and gargle the throat. Give him a hand-mirror, and make him go to the window and examine his mouth so that he can see when he has really cleaned it out.

Ninety-seven out of every one hundred do not know how to clean their mouths. When you get a new patient, put him through this drill till you see that he knows how to clean his mouth. In the treatment of this case you will require astringent, disinfectant, antiseptic washes. You prescribe an astringent, antiseptic wash. After he has used it for a week or ten days, the parts will become inured to it and cease to respond. Then you must change to something else, and keep him on that a little while, and then change again. It is the same with topical applications as in systemic treatment. You expend the force of any given remedy after a time.

For these sub-periosteal disturbances you will want aconite and iodin. Whenever you have a case with local manifestations you want to use the officinal U. S. P. preparation,—the alcoholic tincture of iodin. But if it is of deeper location, then use Lugol's solution. You will recognize two very different types of cases. This patient, to get the most good from your treatment, ought to be under the observation of a competent dentist for at least twelve months. He has decayed teeth; he has inflamed gums; his permanent teeth are not yet all erupted. He requires thorough elimination of all diseased conditions. Let this be your law: If a patient is under twenty-five, and you temporize, and let the patient leave with some uncorrected abnormality, as pyorrhea alveolaris, etc., it will continue to spread and breed continuance. Eliminate all disease.

I am astonished to see how many dentists do not clean the teeth of their patients, and do not teach them how to do it.

If you prescribe hot mouth douches at night, you will be astonished at the improved condition next day.

Dr. C. E. Kells gave a clinical lecture on the use of amalgam.

He said, There has been much discussion of the value of amalgam, but I use it very satisfactorily to myself and to my patients. I see no use in spending hours packing gold into molars where it is never seen,—a most tedious operation to both operator and patient, and which fails comparatively soon. You may spend three, four, or five hours upon it, making a beautiful operation, but to what end? Life is too short to waste it on such useless work. It is far more satisfactory to expend but a fraction of the time, a fraction of your strength, to give but a fraction of discomfort to your patient, and accomplish the same result, saving the tooth even more effectually by filling the cavity with amalgam. Amalgam has its place which it would be hard to fill. It is my main dependence in a large class of cases. The less metal there is in a tooth, the better it is for the tooth. Fill the pulp-chamber with cement, and over that put a veneer of amalgam. You say it is difficult to veneer in shallow places? Yes; it is difficult, I admit, but it pays. You say amalgam will discolor the tooth? Yes; large masses of amalgam will do it, but don't use such large masses. Use partly cement, as I said, or, if in position where amalgam would show and not look well, combine gold and amalgam in the cavity. First fill with gutta-percha that portion that will be visible, and complete the filling with amalgam. At the next sitting remove the gutta-percha, leaving a nice little cavity with one wall of amalgam, and fill that with gold. In large approximal cavities fill it all with amalgam except where it will show, filling that portion with gutta-percha, which you replace the next day with gold. I have been doing this for a long time with great satisfaction. In bicuspids, where you do not want to put gold against the cervical wall, fill up to the gum line with amalgam, and then complete the filling with gold. There is something peculiar in this combination that saves teeth better than all gold or all amalgam. It will last ten years or longer. I invariably use gold and amalgam or gold and tin in soft teeth, though not where it will show ; but it will save those teeth. There are cases where you cannot use amalgam with as much ease as you can gold. In very small cavities hard amalgam will not stay where you want it, and gold is easier. You do your patients a kindness not to torture them with long sittings for gold fillings in the back teeth. For the front teeth there is no choice ; you have got to use gold there. If you take the same care in the use of amalgam as you do in using gold, you will get just as good results. I used to squeeze my amalgam through chamois, but was troubled with the fibers. I now use China silk, two thicknesses. It does not make much difference what amalgam you use if you prepare it properly. I am often importuned to try new brands of amalgam, but I always refuse. It takes three years at least to fairly test an amalgam, and I cannot wait for that when I see no need for a change. I have one case that is fourteen years old, and it is as pretty to-day as when first put in. I have some specimens of my method of using amalgam, and also the instruments which I use, which it will give me pleasure to show you. I wash my amalgam in alcohol, and use Hardman's white alloy.

Dr. J. Y. CRAWFORD. What do you think of the liability of the recurrence of decay in a mouth in which the front teeth are filled with gold and the back teeth with amalgam, as compared with a mouth in which only one metal is used, and that metal gold?

Dr. C. E. KELLS. I can best answer that question by relating a case. Some time ago a lady came to me, a new patient, from another state. She had some beautiful gold work, but it required repairs. One of her first questions was what I would use. I replied that I would prefer cement for the present.

And later?

I said that I should use amalgam later on. She had a simple crown cavity in a lower bicuspid, with extensive decay under and around a gold filling ; a cavity which must have been easily filled. Her teeth were very soft ; so I said that I would fill temporarily with cement, and if there was no further trouble,—say six months later,—I would cut out a little of the cement and cap with amalgam. She replied, "I am delighted to hear you say this, for I am tired of going to Dr. ——— every few months to have the gold fillings replaced."

I think that if the presence of both gold and amalgam in the same mouth has any special effect, it is that it is better for the teeth than all gold. That has been my clinical experience. Life is too short to put gold in the back teeth, even it does last longer. If they were good teeth they would not require filling with anything, and if they have large cavities it shows that they were not good teeth and are not worth gold fillings. I use amalgam in the back teeth under all ordinary circumstances.

Dr. J. Y. Crawford. I would like to call your attention to a peculiar condition which I have called *dry sockets*, not having any other name for the condition I wish to speak of. After the extraction of a certain tooth, the socket remained open and dry for twelve months. I recently had another case, a left lower third molar. The tooth was removed with great difficulty. There was no bleeding from the socket, and the patient suffered more or less pain after the extraction. Complaining of not feeling very well, I suggested that she go in the adjoining room and lie down and rest awhile. She sent for her physician, who gave her some stimulant, and feeling better she went home. She suffered very much that night, and saw her physician again. Still there had not been any bleeding from the socket, which remained entirely open. He gave her a strong opiate, and advised her, if still suffering, to go to me for treatment. Late the next evening she came in. The jaw was somewhat sore and the wound clean and nice. That night she had severe paroxysms of pain, and her husband reported to me that she was suffering very much. The first permanent molar was a dead tooth, on which she had worn a crown for seven or eight years, the second molar being also in position. That evening when she came in she was impressed with the idea that the pain was in the crowned molar. I examined it thoroughly and was convinced that was not the case. The socket of the extracted tooth was still open. I washed it out well with warm water and packed it with iodoform gauze. She was comparatively comfortable that night, and slept some. When she came to me the next day, I removed the gauze, and found that it came out perfectly clean and dry. There was absolutely no exudation in the socket. It continued that way for seven days longer. She was in constant pain, suffering from earache also, even the scalp was very sore. I concluded to use Dr. Savage's remedy for inflammation of the internal ear. He puts a drop of chloroform on cotton, dips it in sweet oil, and passes it into the ear (More recently Dr. Savage mixes the sweet oil and chloroform.) I found I had no sweet oil, and so used oil of cinnamon with a tampon over it. She passed a comparatively comfortable night, but the next day was worse again, and still thought it was the first molar. So I slit the crown and took it off. I found the pulp-chamber filled with gutta-percha and the crown set with cement. The cement had washed out and decay had begun. I cleaned it out and effected an entrance into the back root and partially into the front canals, when she said she felt better. I renewed the dressing of chloroform and sweet oil, with a tampon over it, in the socket, which was still dry. I continued this for a week, nothing giving any relief but the chloroform and sweet oil. She said she had never experienced such severe pain, which affected the whole side of the face, head, and ear. There was no blood, no suppuration, no granulation, but a perfectly dry, clean socket. I have seen a number of such cases, to which I give the name "dry socket." They certainly give much trouble.

Dr. Wm. H. Richards, Knoxville, Tenn. Three or four years ago I had some professional business with Dr. Calhoun, in Atlanta. He called me in to see a case he had under treatment, and asked me to examine it. I found a condition, subsequent to tooth-extraction, exactly similar to that described by Dr. Crawford. The tooth had been out for several days. The socket presented a perfectly clean cavity, in which you could see right to the bottom. The patient, a young girl, was suffering great pain. Dr. Calhoun was treating it by pumping in boracic acid. I examined it very closely, and there was no exudation and no blood-clot. The situation was evidently as new to Dr. Calhoun as it was to me. I was not in a position to offer any solution of the situation, and I never knew the final outcome in the case. But it is a case parallel to that of Dr. Crawford.

Dr. G. F. S. Wright. I have had two cases, perhaps not exactly parallel, but very similar,—very painful sockets with no blood-clot, the socket remaining persistently open. In one case I suspected necrosis in the socket, having worked desperately hard to get the tooth out; both Dr. Boozer and myself having worked at it. Finally I gave a violent twist and broke up the connection, and it came out. I treated with aromatic sulfuric acid, and in two weeks it was quite well. I had another case,—a negro,—exactly the same. I have never reported these cases before, but thought they were incipient necrosis. I would like to ask if you have ever extracted a superior molar and had the patient say he could breathe through the hole?

(—— ———. Yes; you opened into the antrum.)

Dr. H. E. Beach. I am glad Dr. Crawford has stated his case so clearly, because I have had something similar, and came to the conclusion that in the extraction not only the peridental covering of the tooth was removed, but also the lining membrane or periosteum of the socket was torn away, leaving no tissue from which exudation could take place to fill the socket with pabulum for healing it up.

In the last case I had, I was so convinced there was something in this idea that I determined to do something that would make a clot, so I cut through the alveolar process, deep down on both sides; it got well more rapidly than the other cases, and I believe that is the most of the trouble in these cases, that we have removed the periosteum of the bony socket of the tooth; taken out both the peridental membrane and the periosteum of the socket. There can be no exudation, and the sensitive inflamed tissues give intense pain,—"worse than four toothaches," as one patient expressed it. But if we purposely break down the alveolar socket we induce a new circulation, and it fills up by granulation. This is better than applying remedies.

Dr. Crawford. I am glad I reported this case, and I want to know if I have named it right. In another case I am sure there was no involvement of the soft tissues and that the bone was not injured; the socket remained open twelve months. I then curetted the entire cavity, hoping to induce new surgical conditions (I think, if I have another case of this kind, that I shall break down the process entirely); a month later there was no evidence of improvement. Ten days ago the patient was not suffering quite so much, and the gums showed some activity of circulation.

Dr. A. P. Johnstone. I have not been troubled with any cases of that kind, but I would suggest that hot water would prove most soothing, used thoroughly for a long time, using hot wet towels on the face, or a hot-water bag——

(Dr. CRAWFORD. She tried that very thoroughly at home.)

Dr. JOHNSTONE (continuing). For six years I suffered from synovitis, going through the usual treatment,—aspirations, etc. Being in Nashville, Dr. Morrison advised the use of hot water. Having the foot in hot water, cover the limb with a blanket and pour boiling water gently upon the blanket. I kept that treatment up for three hours, and that one treatment cured me, and I have had no return of the trouble since.

Dr. CRAWFORD. There is no question in my mind but that in many obstinate cases of inflammation, as in periostitis, in inflammation around the roots of the teeth, great benefit is derived from the use of hot water long continued, irrigating the mouth thoroughly with water as hot as can be borne. In cases which do not yield to this treatment, an alternation of hot and cold will often accomplish a resolution.

Dr. J. F. GRIFFITH, Salisbury, N. C. When the third molars are hard to extract they are very hard indeed. It requires heroic work ; nothing else will do it. But there is a great strain upon the alveolar plate, and the pressure upon the soft tissues results in injury to the nerve terminals. The distention of the parts is an abnormal condition which interferes with normal repair. I have had a few such cases. To relieve the pain, with the thumb and fingers I press the sides of the socket hard together, having the plate sprung in. This pushing of the parts together often gives great relief.

Dr. S. EWING SMITH, St. Augustine, Fla. No one has mentioned my way of giving relief in such cases, and I have had many such cases, where there is no healing of the socket for weeks ; and even for months, in two cases. The opening remaining always the same size, I got tired of treating it. I had tried everything I had ever heard about, or that I could imagine. Finally, one day I went into my laboratory and got a big nail—a thirty-penny nail—and bent the point over. Then I placed a cloth over the eyes of my patient, so that he would not see what I was doing ; and heating the nail red hot I plunged the point into the cavity. I then *treated the burn*, and it healed right away !

On motion, adjourned to 8.30 P.M.

(To be continued.)

DENTAL SOCIETY OF THE STATE OF NEW YORK.

(Continued from page 700.)

FOLLOWING is the discussion on the report of the correspondent, printed in the DENTAL COSMOS for August, page 693 :

Dr. F. W. LOW. I never have made a porcelain inlay, for the reason that I never saw one I wanted to imitate, and I have seen a great many inlays. A gold filling, where it shows, is an indication, so far as the esthetic side of it is concerned, that the wearer of it takes the best means to preserve the teeth that dental science is aware of. I believe it is conceded by the writers of those letters that gold is most durable. The American esthetic people do not wear gold fillings as ornaments, but as a necessity, and so long as it conserves the tooth better than any other material, I think it should be submitted to. The appearance of most porcelains in the anterior teeth could be readily mistaken for a tooth that was not properly cared for both by the patient and the operator, and I believe that as a matter of esthetics we have a right to wear that thing which indicates that the tooth *has* been properly cared for. If the porcelain inlay gives the impression that the tooth is becoming eroded, is neglected, stained, and unclean, I think it is more objectionable than gold.

Dr. S. G. PERRY. But if it gives the impression that it is a perfect tooth, I think the argument is on the other side. I only want to say a word about the habit of Americans allowing gold to be seen. It only marks one side in our progress, which indicates what we will come to. The time will not be far distant when we will look back on these fillings with shame. We will look back on them as we do on those old instruments in museums. We must admit the bad appearance of some of those inlays, but that should not prevent us from making further efforts. We must not be content to rest where we are in this matter. It is too important.

Dr. LOW. I have seen some cases that were beautifully matched at the time they were put in. Two years afterward they looked like badly eroded teeth.

Dr. R. H. HOFHEINZ. I saw a large amount of that work when I was abroad. I did not see the work after a sufficiently long time to warrant me in doing it, but I think, as Dr. Perry does, that we are wrong in not making further efforts.

Dr. W. JARVIE. The few porcelain inlays that I have seen have been not at all satisfactory. I think on the labial faces, if the surface is not too large, as far as our present intelligence is allowing us to do the work, that gold is less objectionable than imperfect inlays. Gold is yellow, and there is a yellow cast in every tooth. It is a different shade of the same color, so that there is less contrast between gold and tooth-substance than between tooth-substance and any other filling-material we have, except a perfect match in porcelain. Take the various zinc cements; they are opaque, and where exposed to view they are much more noticeable than gold. There are many cases where porcelain inlays can be used to great advantage, both from an esthetic point of view and in saving the teeth. One such case was mentioned in the report of the correspondent. I had an almost similar case to treat some two years ago. I agree with Dr. Perry that some time in the future we will look back upon our large gold fillings with regret, and while we may still admire them as the result of mechanical skill, as works of art we will not. I hope the gentlemen will investigate and experiment in this line, and perhaps next year or the year after something will be brought out here that will advance the value of our services from an esthetic point of view.

Dr. C. K. VAN VLECK. In the winter of 1877 and 1878, when I was at Philadelphia, I had the pleasure of seeing Dr. Essig perform an operation. I think I saw him make four porcelain fillings, and in each case, after they were cemented in, he cut out the cement with a very fine instrument, and filled the crevices with soft gold. I put a filling of that kind in myself after I graduated, and it is there now, over sixteen years. It is just as good as ever. The line around the porcelain is filled with gold, and it is so thin that it shows very little.

Dr. PERRY. I have done that repeatedly. My habit for a long time has been to take the teeth made by the Ash Company, and strike them with a heavy hammer, breaking them into a great many pieces, and preserve those pieces. They will flake up into small pieces, and from them the color can be gotten. I have not done many, but I have a number that have been in for years. I do not think one ever slipped out and got lost. I have often finished the joining in the manner just described, and never knew it to fail.

Dr. L. C. LEROY. From listening to the gentlemen this morning, and the expressions given in other dental society meetings, the general verdict is against fused porcelain fillings, and in favor of the ground inlay. I have not performed very many in my practice, but have attempted to do so, and I find that the ground ones give more satisfaction than the fused. I invested in the apparatus sold by one of the manufacturers some time ago, and found it a radical failure. Those that were not ground seemed to deteriorate in color after a time. Whether it was imperfect manipulation or the fact of the porosity of the material, I do not know.

Dr. WRIGHT. Twenty-six years ago my preceptor placed a number of inlays in teeth, following the line of taking a porcelain tooth, grinding the tooth entirely away except the exact part that he wanted to use. Be very particular to get the color shading a little lighter. After placing it in position with the finest fissure bur, remove the cement and fill with gold, as explained by Dr. Van Vleck. By having the tooth a little lighter, there is no trouble from having the small line of gold. The difficulty is in grinding that piece of porcelain to its proper thickness. If you have ground bone-tissue for microscopical work, you will remember that when you get it so thin as to almost grind through, just mount it on a piece of cork and place it in water, and you can grind it as fine as you choose. It is one of the easiest ways that you can possibly find.

Dr. W. W. WALKER. I have seen a great many inlays, especially in the anterior teeth, but I have never seen any that were so satisfactory to me as work done by a friend of mine, in which, after the cavity is properly excavated, he fills with gold, and he tops off with gold and platinum foil. More beautiful work I never saw in my life ; and at no closer than speaking distance you could hardly tell that the tooth had been filled. The work is being done every day by Dr. McKellops, of St. Louis, and I think it is superior to any porcelain that can be put in. I have seen inlay pieces in lower and upper molars, and in crown cavities, which have been inserted beautifully, but in finishing them they have taken nearly the entire crown of the tooth.

Dr. OTTOLENGUI. In closing, I wish to allude to two matters which will perhaps give you at once the benefit of my own experience : First, one difficulty in this work is to contour a filling properly, and here comes the advantage of Dr. Jenkins's method. You bring your filling up and you find that after the porcelain is fused perhaps you have made it too high. You can grind it down flush to the surface you want, and even after the gold is ground down it will not matter, because it is fastened at the back. If that were set, or fused again and set, it would not be as satisfactory as to take it down-stairs and fuse a bit of glass over it. Glass prevents the passing through of organic matter. It prevents the surface from being porous, and it gives a beautiful finish. There is one point about the glass to which I would call your attention. The glass being laid over the filling and put in the furnace, the edges of the glass melt first and are likely to fuse to the filling before the center of the glass has melted, and the result is, when all is melted down, there is an air-bubble in the top of the tooth. If that occurs, after it is cool simply break the bubble and fuse it again, and you get rid of the air. I discarded several fillings on account of those bubbles, before I discovered that I could fracture the bubble, put a bit of powder in the hole, and fuse it again.

The next point is, as I said before, you will find very few people in America who care enough for the esthetics to pay for porcelain fillings. There is a class of fillings that have been a bugbear to me. A bicuspid comes to me of which much has been lost, and which contains much decay inside near the pulp. The tooth is sensitive, the patient is nervous and fidgety, and it is a very difficult thing to put in a gold filling which will save that tooth. That is one place where gold is less serviceable than any other position in the mouth. I cannot bring myself to put amalgam fillings in bicuspids, if I can possibly avoid it; therefore, it seems to me that in those teeth which I have in the past filled with phosphate, until later in life when the pulp had receded sufficiently to get proper undercuts for gold, there it seems to me is the place for a porcelain filling, which would do more than be esthetic; it would save the tooth and save pain to the patient; but there is the most difficult place to put a porcelain filling.

Dr. S. G. PERRY, of New York, then read a paper entitled "Professional Fees,"* which elicited the following discussion:

Dr. JARVIE. I always consider it a thankless task to be asked to lead in a discussion on one of Dr. Perry's papers. What he has to say is always said in such an interesting manner, and his line of reasoning, as a rule, is so in accordance with my own ideas, that there is nothing left for me to say, except that I agree with the speaker entirely; and yet, to-night, I am not prepared to make a statement of that kind, for there are some things in the paper with which I differ. In the early part of the paper Dr. Perry has given us a most interesting account of the origin of the term "fee," and the customs under which that fee was given. The term "honoraire" is used to-day in France as it was used in olden times, and under many circumstances it is given to-day as it was given six or eight hundred years ago. The highest personages of Europe never have a bill rendered to them for professional services. They give a fee, and that fee is generally in accordance with the length of their purse and their own idea of the value of the services rendered, and the amount is not suggested by the person rendering the services.

In our own land, and with a more modern way of doing things, it has become customary to render a bill for services. I think it is done in every profession except the clerical. The lawyer, the physician, the surgeon, and the dentist render bills for what they deem a proper recompense for the services rendered. We are brought more particularly to the consideration as to the proper rules to govern us in deciding the amount of the fee. Our work is somewhat in the nature of surgery, although not entirely so, for some of it is almost mechanical; and yet all the services we perform for our patients, if not giving pain, certainly cause discomfort. Time is an important factor to be taken into consideration in fixing our fee, but I believe we ought to charge in an inverse ratio to the time occupied; that is, if one operator can perform an operation in fifteen minutes that will take another man thirty minutes to perform, and do it as well, the man who can and does perform it in fifteen minutes is entitled to charge as much again as the man who will take thirty minutes. He has saved his patient so much time and discomfort that he is entitled to charge accordingly.

---

* Printed in full in the DENTAL COSMOS for October, page 815.

The most uncomfortable feature in my professional experience is having to take into consideration the question of dollars and cents at all, and having to fix a money value on my services. If I am doing anything that is very engrossing, I do not want to think of the fee, if I can help it. Let me cite two cases. I have had recently two remarkable cases of erosion,—the worst I have ever seen. The operations were tedious to the operator and to the patient. Some of the teeth were cut through two-thirds of the entire thickness, and I filled them with gold. One case involved twenty teeth, ten teeth in the upper and the same number in the lower jaw; and the other case involved twenty-four teeth, from first molar to first molar in each jaw. Both the gentlemen in whose mouths this occurred were men of wealth, but commercial men. They were accustomed to place money values on everything. Before commencing the operations nothing was said about the amount of money to be paid. When I was half through, one gentleman said, "How large a bill will you have against me?" I said, "I am sure I do not know. I have not given it a thought, but it will not be more than you can pay." Two or three times afterward the amount of the bill seemed to worry him, and he spoke of it. I asked him not to mention it again. I said I wanted to do the best I could for him, and afterward we would talk about the bill. The experience in the other case was very similar. In both cases, when I was through they said, "Can you send me your bill to-day?" I did so, and in each case I received a check the following day with a very kind letter accompanying it. I charged what I thought was a fair compensation, and I was satisfied with the amount of the bill. I make this digression simply because I want to say that if I felt every half-hour I was working for so much money I would get very little satisfaction in performing operations I was interested in. The dentist is called upon to perform such a variety of operations, and operations under such varying conditions, that in estimating the amount of the fee to be charged many factors must be taken into consideration. Some services rendered in an hour are infinitely more valuable to the patient than others that would occupy the same length of time.

The character of the operation might be such that only by the exercise of the highest degree of intelligence, and the greatest degree of skill and the utmost intensity of application, could success have been attained; and would any one argue that the result of one hour's work calling for such intelligence, skill, and application should be charged the same sum for as the work of another sixty minutes spent in an operation so simple and so little exacting as to be almost a pastime?

Or, should an operation occupying one hour, and performed upon a nervous, sensitive, and somewhat fractious and restless patient, calling upon all your best efforts to control the patient, to say nothing of controlling yourself, and requiring all your ingenuity to successfully accomplish anything satisfactorily, the whole making such a draft upon your nervous energy as to be exhausting,—I ask should an hour occupied in such a manner be charged no more for than sixty minutes spent in working for a patient suave and passive, and in whose society it is a pleasure to be for that length of time?

No, gentlemen; while time should be a factor taken into consideration in estimating what the amount of our fee should be, it should be considered in the manner I have stated, otherwise what stimulus has a man to endeavor to shorten the time to be occupied in dental operations by procuring the finest instruments, the most approved appliances, and the best-trained assistants?

These all aid him in accomplishing better results, and in accomplishing them in much less time than he possibly could without them.

The essayist says there can be no comparison made between the day laborer and the dentist whose operations are valued by the time occupied in performing them; but, gentlemen, where is the difference in principle between the laborer who is hired to work for a dollar and a half per day, and the dentist who is to be paid ten dollars per hour?

The dentist's estimate of the amount of his fee ought to be based upon the degree of intelligence, learning, and skill required; upon the amount of nervous energy expended; upon the draft made upon the dentist's vitality; upon what has been accomplished for the patient; upon the perfection of the result; and, everything else being equal, upon the time occupied, the value of this last factor being estimated in proportion to the shortness of it.

Dr. J. I. HART. I want to ask the last speaker, Dr. Jarvie, how is he able to make a comparison between the time a given operation will take him to perform, as against another individual performing the same operation? And why is it proper to make a larger charge for a difficult operation taking the same time that a simpler operation would in proportion? While I am perfectly willing to admit that there are different grades of ability or intellectuality of individuals, it strikes me that the same degree of ability, barring experience gained by education and time, is employed constantly by the same operator. What I mean is that the intelligent man is using the same degree of ability on his simple operations as on the difficult ones.

Dr. JARVIE. I will answer the last question first. A dentist with a given amount of intelligence and ability is supposed to exert both during every operation; but there are certain operations where an intensity is required, a concentration of all the forces you possess, mental, physical, and nervous, on account of the nervousness of your patient or the delicacy of the operation,—working in close proximity to the pulp, or on thin edges, or the margin of the gum, where the least slip will destroy your operation. Sometimes in sixty minutes I put in two or three hours of my life as I would ordinarily spend it. That is why I would charge differently for such an hour's operation than I would for another. In regard to the relation of time occupied by one operator and another, we all know among our professional friends and brethren that one man has comparatively few appliances to facilitate his work. He possibly has no assistant at the chair, or the devices to aid him that you have for the same operation. One is using the labor of two people, and your own intelligence must tell you that more can be performed by one person and with greater comfort to the patient, under such conditions, than by one who has no assistant and few appliances, and therefore there is a great difference in the result in a given time.

Dr. W. W. Walker. I did not intend to discuss this paper. While Dr. Perry was reading it I thought he had said everything, but since Dr. Jarvie opened the discussion he put it in a different light to me. We all love our profession. But what about the young men who are starting out in the world, who have probably spent their last dollar to get through college and start out in country towns? Do you mean to say they do not examine the teeth to see how much they will get out of it? Some men employ one or more assistants. Why do they have the assistants? When they get their hands full of high-priced people, from whom they get large fees, they turn the others over to the assistants. They say if they can get twelve dollars an hour from such a person, why should they work for some one else for four or five dollars? I am not ashamed to go on record as saying that when a patient comes to my office, and I look at his teeth, I wonder just how much there is in it, and when I get through I wonder if I am going to get my money.

Dr. Hofheinz There is no question that all systems of charges have their faults. If the system of charging as Dr. Jarvie has advocated could be employed in all cases, it would be the ideal way of doing. I am not quite as bad as Dr. Walker, but I am between the two. You never can tell what circumstances may intervene in doing the same work for different people. It may require double the amount of time for the same operation in the mouth of one person that it does in another. I believe the system of charging by the hour comes nearer to the correct method than anything else. The suggestion that Dr. Jarvie has made in regard to charging more for difficult and exhausting operations per hour than for the ordinary ones is exactly what I do. I think it is the judicious way for myself and for my patient. Has the dentist a right to charge the rich patient more than the one who is not wealthy? I do not say the poor, because there are many people who cannot afford to work for the poor. I would like to hear Dr. Perry speak on the subject. The greatest trouble seems to be, how are we going to compensate ourselves for the many little services that we must do for which we get nothing, the enormous amount of small things that we are called upon to do and for which we cannot charge? We certainly ought to charge for consultation, although I believe the majority of us do not. The physician, whose services are not always more important than ours, receives pay for all. I would like to know what other people do about these things. There is no profession, I believe, which is paid less for the enormous amount of energy, physical, psychical, and moral forces that are spent every day in our labor, than dentistry, and if there is any profession that should not be practiced for God's sake, it is dentistry.

Dr. M. L. RHEIN. I did not draw the same conclusion from the paper as Dr. Jarvie did. The subject of fees is one that I discussed at a meeting of the society some years ago, when I spoke against what I considered the pernicious habit of making out a bill of items in the same manner that we would receive a bill for groceries or merchandise. As I understood Dr. Perry, he advocates the method of basing his individual charges by time, but leaving to himself the gauge for the value of the time that he is using for each individual patient. I can see absolutely no other way in which we can get a reasonable basis for the value of our services than by time, and I can also perceive no way in which we can say to patients that our time is worth so much day by day. The two things do not harmonize, unless we are capable of making automatons of ourselves. If I attempted in my practice to pursue any such method as I have heard is pursued by some men, so they would use every minute of the day, I know I would have very few months left to practice dentistry in. I use my day according to the manner in which I feel physically able to use it, and when I get through with an operation I value that operation strictly on a basis of time ; but I may value it in the morning on a basis of ten dollars per hour, and the next patient I may value it at fifteen dollars an hour, and in the same day I may value it at five dollars an hour. I cannot see how you can tell a patient that a piece of work will be worth so much, when beforehand it is absolutely impossible for the operator himself to gauge the value of that operation. I have never performed a piece of work in the mouth, any operative work, that I could conceive beforehand what value I was going to place upon it, and for this reason I never do a piece of work (I am speaking now of operative dentistry) unless every portion of that work is done absolutely as I think it should be for the welfare of that patient. If a patient is not willing to allow me to use my judgment in that matter, I decline to be the professional adviser or operator for that patient. If the patient has sufficient confidence in me to have me do the work, then I tell him it is necessary for him to have the same confidence in my ability to value my time proportionately for whatever I may do. We all know there are times when our services are not worth so much to the patients. In those cases it is not fair to charge as much as at other times, when we feel we are rendering in fifteen minutes more value than we ourselves might do on another occasion in thirty minutes. I agree with Dr. Jarvie there. I think our services are worth twice as much to that patient as they would have been when we were forced to take thirty minutes to do practically the same thing. There are certain things that we can charge a fee for. I always make it a rule to charge for consultations. I do not say that I do as the judge does, that I do not remit the charge ; but it is a cardinal principle in my practice that such a charge shall be made in accordance with the dignity of our practice. If I remit the charge, there must be some good reason for it, and I distinctly allow the patient to know that the charge has been remitted.

Dr. JARVIE. What do you call a consultation?

Dr. RHEIN. Any visit that takes up my time, whether it is a visit by the patient who wants to know what I advise in regard to his mouth, or a consultation with another dentist. I cannot spend the time necessary to give him examination and advice without charge. I have adopted the plan of sending my patients (with the exception of a very few who have told me that they do not wish it) a bill on the first day of every month for the services I have performed during the month. The object of that is that if there is a disagreement between them and myself as to the value of my services for the entire month, or three or four days in the month, I prefer to find it out as early as possible. With patients who seem to have a diffidence about accepting that point, and who state to me that they cannot understand what my fees will be, I say, "I will tell you my fee at the completion of each sitting, if you prefer it." I would rather do a cash practice than charge it up, any time. I believe if we could be paid at the completion of each operation, for our services, we would be paid far better in proportion to the work we do. The man who does good dental work has never been overpaid for the energy and the worry that a piece of work has brought upon him. If we could receive cash payment at the end of each operation, our income would be better than that obtained from running up a bill for five or six months.

Dr. HART. It is probably as well to settle a question of this kind here, while it is being discussed. The strongest argument against Dr. Perry's remarks was made by Dr. Rhein. If one's mental and physical condition is not always the same, I do not see how one can compare the depleted mental and physical condition at that time with some one else's condition which is not depleted. How can we reasonably say to our patients, "My condition is such that I can charge you fifteen dollars in the morning, and in the afternoon I need only charge you twelve dollars"? Our patients will want to come when our physical condition is at its lower value. I am ready to admit that one tooth may be weaker than another, and more difficult to fill, but equal intelligence will only require greater time to fill a difficult cavity than a simple one.

Dr. OTTOLENGUI. The question has been asked,—Have we a moral right to charge the rich more than those who are less wealthy, not the poor? I object to the question in that form, and I do not allow a patient to put it to me in that form. We have a right to charge some persons less than we charge others. It is right for a man to charge as much for his services as he can get, without being extortionate or unscrupulous. The rich man is just as careful about his dollars as the poor one; possibly that is why he is rich. The difference between the professional man and the commercial man is this: The dry goods store is conducted on the commercial plan; the pauper will pay as much for an article as the millionaire, and the millionaire buys as cheaply as the beggar. The professional man has a charge for the rich man, and will accept less from the man who cannot afford it.

I cannot have any time limit. I am not an eight-day clock. There is a clock in my room; I would never wind it if it were not wound for me. Many people come to me who have been charged by the hour by other dentists; if I make a comment on the latest newspaper topic they look at the clock; then I tell them I am not charging by the hour. The point is just here: A man should get all he can, and at the same time exact only what the patient can afford to pay.

That will be the best policy in the end. If your patients feel that you consider them as well as yourself, they become your friends, and send other people to you.

I wish to say a word about consultations. I have no consultation fee, but sometimes I make people pay well for a consultation.

Subject passed.

Dr. M. L. RHEIN then presented the

REPORT OF THE COMMITTEE ON PRACTICE.

The marvelous increase in the use of electric force has been the main feature in dental practice during the past year. The term "cataphoresis" signifies the forcing of some medicinal substance into tissue by means of the galvanic current. While the value of this important power has been known for many years, and has been in use in other branches of medicine for some time past, it is only within the past year that it has been so successfully introduced into dental practice. It is not a question of who first discovered the ability to apply this therapeutic agent to dentine, but who first presented it to the profession in such a manner as to make its use well-nigh universal within a few months. The credit for introducing cataphoresis in a practical form to the dental profession is due to Dr. H. W. Gillett, of Newport. While it may have been used to a certain extent by many other men, the means at their disposal for applying the amount of current necessary to force medicinal agents through dentine were so primitive that there was nothing gained in its adoption. The exquisite sensitiveness and the enormous resisting power of dentine rendered necessary the commencement of cataphoresis with the smallest fraction of electric power attainable, if pain was to be avoided. It was likewise necessary that the increase in ampereage should be graduated with the same minuteness. All the old forms of rheostats which were successfully used in painlessly producing cataphoric anesthesia of the soft tissues, were found to cause more or less pain when applied to living dentine. Dr. Gillett earned the laurels he has won by devising a rheostat which enables the electric current to be subdivided into such minute fractions that the increase from the very smallest power to the highest is accomplished without any sensation of pain to the patient.

Local anesthesia of dentine has for many years been eagerly sought by both patient and operator. Many methods have been advocated, all of which have had certain advantages; but all have been subject more or less to the disadvantage of subsequent hyperesthesia.

The use of cataphoresis will prove no exception to the general rule that anesthesia is followed more or less by hyperesthesia.

Your chairman, in order to demonstrate to himself the practicability of producing anesthesia of the dentine by the cataphoric use of cocain, made a special visit to Newport in October last, and had a central incisor in his own mouth anesthetized in this manner by Dr. Gillett. His object in doing this was to enable him to accurately judge of the sensations during the stage of anesthesia, and any that might follow. It is a difficult matter to obtain a satisfactory opinion on this subject from the statements made by patients.

Total anesthesia was produced without a particle of sensation upon a central incisor which had been rendered exquisitely sensitive by the inroads of erosion. The current was applied for about twelve minutes, when there was no question of the lack of sensibility in the dentine of that tooth, although it was not operated upon. This stage lasted for about thirty-six hours, and was immediately followed by an increased sensibility of the tooth, which, after a lapse of about twenty-four hours more, had become quite sore to the touch, and felt as if a severe attack of pericementitis were commencing. No therapeutic measures were used to assuage this sensation. The hyperesthesia appeared to have reached its zenith at about the thirty-sixth hour, and then suddenly entirely disappeared, without any subsequent recurrence or annoyance to the tooth up to the present time.

In 1889, when your chairman introduced to the profession the use of the chlorid of methyl for producing local anesthesia of the dentine, he placed especial stress upon the necessity of using as small a quantity as possible in order to avoid as far as possible the subsequent danger of hyperesthesia. The same caution is necessary in the cataphoric use of cocain in dentine. Many disastrous results have been reported to your committee since the introduction of the Wheeler fractional volt selector. No discredit for these results should be attributed to what is at present probably the best rheostat we have for this purpose ; the results are very likely due to the unnecessarily large amount of cocain introduced into the tooth.

It seems likely that in these conditions there exists a law of equivalence which makes the length of the stage of hyperesthesia equal the length of the stage of anesthesia.

During the exposition on this subject by Professor William J. Morton, before the First District Dental Society, Professor Morton called our attention to the possibilities of medication of the tooth in the way of bleaching by cataphoresis, and also in the way of introducing medicinal agents into the peridental tissues. At the same time he demonstrated the therapeutic advantages of electrolytic medication in the peridental tissues. While the use of cataphoresis for bleaching purposes has been very vigorously prosecuted for some time past, nothing definite has been heard from the possibilities of treating alveolar abscesses, pyorrhea alveolaris, and dissolving uratic concretions on the roots of teeth by means of this method.

In the treatment of these pathological conditions there is opened a field for harmless experimentation, to which your committee earnestly invites the co-operation of all practitioners possessing the means by which they may employ cataphoric medication.

The latest marvel which has illuminated the world from the electric sphere has been the wonderful discovery of Professor Roentgen, so well known as the "X ray." The possibilities to which the shadowgraphs and radiographs (to say nothing of the fluoroscope) may be put in a medical way have received such universal attention by the public press during the past few months, that it is no doubt well known to all of you.

At a recent special meeting of the New York Odontological Society, Professor William J. Morton demonstrated the fact of the invaluable aid which this may prove in our particular specialty. Before this demonstration, it was a question whether it was possible to obtain a picture of the roots of the teeth, locked as they are between the plates of the alveoli. He demonstrated, however, that on account of the greater density of the roots it was possible to penetrate through the alveolar plates and obtain a perfect picture of the entire tooth from the crown to the end of the root.

All doubt of the practical adaptability of the X ray for diagnosing hidden dental lesions around the outer periphery of the root have disappeared after this demonstration, and it opens another door by means of which the work of the dental specialist will become the most mathematically accurate of any branch of the art of medicine.

Discussion.

Dr. VAN WOERT. The president has asked me to open the discussion upon this report, and I propose to do it by giving you a little recital of some of the clinical experience I have had in cataphoresis. The most important of all my "findings-out," so to speak, is the fact that the current used for producing anesthesia, or for the introduction of medicaments into the soft tissues of the mouth, should be of as low a tension as possible, with as high a volume. As to the means of doing that, I have nothing to say. There are, as I understand, several apparatuses which will do it perfectly. I know of two. But the application of the current in the hands of the general operator has been a very difficult matter. When you take into consideration the fact that you are obliged to stand with an electrode in your hand for from ten to twenty minutes, it makes it very unpleasant, to say the least. Dr. Rhein said it took twelve minutes to anesthetize his tooth. That was quite a short time. In the beginning, I was imbued with the idea that I must get from thirty to forty volts in current to produce.the results. Later clinical experience demonstrated to me that fifteen to twenty volts will do just as well, and with less time. In other words, if the voltage is cut down in a tooth of high resistance, you get a larger milliamperage carrying the medicament with it as effectively as if you had a high pressure with the small volume. In the anesthetizing of dentine for excavating sensitive teeth, I do not agree with the chairman that the cocain is the agent which produces the after-results. I think it is the electrical current, and if that current is cut down to a minimum, as it is possible to do with the apparatuses which are before you, you can put a saturated solution of cocain into the tooth without any injurious effects following it. If, on the other hand, a mild solution of cocain is used and a high pressure, there is pain produced in getting the current through the tooth, particularly if the tooth is dense and the resistance high ; and the sensation to the patient is not as satisfactory, because of the fear of pain produced by this current. If the current is reduced in pressure, and the volume increased, the sensation is almost nothing, and the results are the same. I find, in my later practice, that a saturated solution, with from fifteen to twenty volts and from three-fifths to one milliampere in volume, gives me the best results in the least time. The same is applicable to the anesthetizing of soft tissues. Your chairman spoke of the possibilities in the treatment of pyorrhea. I demonstrated at the New York Odontological Society last month, that the soft tissues could be anesthetized so that the pockets could be cut open without the least sensation other than the fact that the patient was being worked upon. The sensibility of the roots had entirely disappeared, and you could take a scaler and cut into the pocket without causing the least particle of pain. That application was about fifteen volts, with two milliamperes in volume and nine minutes in application. I have since operated for the same gentleman on other teeth, and I am going to do so again. When I operated on him at the office with my own apparatus, I found that six minutes with ten volts and two and one-half milliamperes gave me the same results that I got here in nine.

Now we get back to the question of the application of the current, not the control of it. To a busy man the necessity of holding an electrode for the introduction of medicaments becomes very irksome. It is also annoying to the patient to have the operator stand there for that length of time. To overcome that difficulty has been my aim for some little time, and in that line I want to show you on the blackboard something that you can make in your own offices, which will be a practical electrode for any case that may come to you. In the first place, the most difficult cases we have to anesthetize in sensitive dentine are those cavities along the buccal surfaces, well down under the gum-margin, where considerable pressure is necessary to get the rubber-dam clamp into position to protect them or isolate them from the cocain which we put into the cavity. First get a rubber cup, such as is used for polishing. (Illustrating.) There are three sizes furnished by almost any supply-house. Passing through that cup is a wire to connect the current. In the cup is the pledget of cotton on which the cocain is put. That is carried to the place where you want to make the application. Five minutes will so anesthetize the soft tissue that you can place your clamp in position without causing pain. When you have the clamp in position, the anesthesia of the dentine is the next consideration. To overcome that, take German-silver spring wire and simply spring it in on the lugs of the rubber-dam clamp, placing the cotton on the cavity and saturating it with your solution of cocain. It is certainly as good as you can get. For approximal cavities, I found that the clamp would not serve the purpose. I took the same kind of wire and bent it, using the same connection on the cord, to connect the electrode. This has a little hard-rubber piece on it to prevent it from puncturing the dam. The spring carries it up into the cavity under the cotton. You can all make this in your offices, and it is utterly impossible, after you get it in place, to get it out without tearing the dam or bending the electrode. You can use whatever current you wish, and leave the patient in the chair while you are attending to other duties. It relieves the operator of the strain placed upon him if he has to stand for several minutes with an electrode in his hand while there are other patients waiting for him. For the introduction of medicaments on soft tissues, combined with the hard tissue, instead of using the hand electrode, as I originally did, I made one of the same kind of wire and covered it with small rubber tubing to insulate it. On this is placed the cup, the electrodes passing through. In the cups are placed the pledgets of cotton saturated with the medicament which you wish to use. There is great difficulty in using electricity in the mouths of children, from the fact that they will allow the ordinary negative electrode to sag. They make and break the circuit. They do not drop it, but they forget to hold it tight. I devised a piece of tin with a sponge on the other side, made to slide over the wrist. That is an important thing. If you use electricity very much, you will find, if you depend upon the hand electrode, they will forget to hold it tight, and let it sag, and if you have only ten volts on and jump from nothing to ten volts each time, you will make your patient jump each time.

The best machine that was ever made, if it depended on such things as I have mentioned, would be condemned. If you have not these little electrodes, you can make them yourselves. It will make cataphoresis practical for you, and give results that are simply astounding. In the treatment of pyorrhea, in the introduction of cocain in the first place, it is marvelous to note the results we get. I follow the surgical treatment up by using one-half strength tincture of iodin, diluted with water. Iodin will go from the positive to the negative, or from the negative to the positive. It really makes very little difference whether you have one or the other. But in all other cases you must have the positive pole in the tooth and the negative on the wrist. I believe there is much to come out of electrolysis with this apparatus,—low voltage and the introduction of zinc chlorid, as Professor Morton told us. I have one case in mind, in Brooklyn, that I have tried for months to cure: to eradicate a stubborn sinus, chronic alveolar abscess. I was one of four different dentists who tried it, and I failed. I finally said the tooth would have to come out. Just about that time Mr. Wheeler brought into my office one of their machines, and later I dipped a piece of very fine wire into zinc, afterward coating it with chlorid of zinc, forming a little ball at the end; the wire was insulated with paraffin; it was carried to the seat of the abscess. A current of ten volts was turned on and kept there for about five minutes, and that mouth is as perfect to-day as it can be. There is no credit due me for that, because Professor Morton told us about it; but the results are marvelous. Since that, I have used it in many cases and with like results, so I feel that cataphoresis in dentistry is going to be as necessary as the dental engine.

AMERICAN DENTAL ASSOCIATION.

(Continued from page 864.)

SECOND DAY—*Morning Session* (Continued).

SECTION VI, Etiology and Physiology, was called, and Dr. J. D. PATTERSON, Kansas City, the chairman, read his report, as follows:

The committee in preparation for this meeting has, through its secretary, Dr. L. E. Custer, solicited from the members of the committee and others, contributions upon the subjects embraced in the section, but with negative results. Two papers only have been presented, and as they did not bring out original or valuable theories or investigations, they were not deemed of sufficient value to present to the main body.

In looking over the literature of the profession of the past year as it referred to etiology and physiology, your chairman decided to occupy the time at his disposal in pointing out new light which has been brought forward upon the etiology of pyorrhea alveolaris.

It would scarcely be more than repetition of what has been presented to this association if attention were directed to the continued discussion of the well-known claims of those who argue that the uric-acid diathesis is the chief factor in the etiology of this disease ; but instead we desire to call attention to new arguments in opposition to this theory, and also to notice new theories in relation to the disease in question.

In a paper read before the Minnesota State Dental Society, September, 1895, by V. A. Gudex, M.D., D.D.S. (*Dental Review*, January, 1896), the author argues against the uric-acid theory, and attributes attacks of pyorrhea to anemia and imperfect tissue nutrition. He says,—

"Is uric acid the cause of rheumatism or pyorrhea? The agitators of the uric acid cause have never attempted to explain this question, but simply assumed it is an established fact. Where they obtained their authority I absolutely do not know. But I do know that it is a most extraordinary claim. Persons who have made a life study of this disease, and have written volumes on its symptoms, diagnosis, and treatment, say they do not know the cause of rheumatism. Not a single modern author on practice of medicine claims to know the originator of this ailment, and all research in the bacteriological laboratory does not better things much.

"Rheumatism, according to some authorities, is due to faulty nutrition ; others say it is an infection, and then there are a number who say it is both. As examples of diseases due to faulty metabolism may be mentioned eczema, urticaria, impetigo, erythema, inflammatory condition affecting the mucous membrane of the respiratory passages, chronic acid dyspepsia, congestion of the liver, lithiasis, hemorrhoids, neuralgia, hemicrania, congestive headaches, gout, all forms of rheumatism, rickets, scurvy, diabetes, obesity, and polyuria.

"Imperfect tissue metabolism as well as the oxidations of the different foods result in the formation of the following acids and substances: uric, hippuric, oxalic, carbonic, lactic, and lactates, caprylic, caproic, valerianic, butyric, propionic, acetic, stearic, oleic, palmitic, formic, cholalic, taurilic, damaluric, damalic, and succinic acids, etc. . . .

"The triphosphate of calcium of the tissues yields two equivalents of calcium which combine with oxalic acid, and the remaining acid phosphate of calcium passes, in state of solution, out of the tissues, and is eliminated in the urine. Hence, heavy deposits of the phosphates in the urine denote active tissue waste.*

"Here are twenty acids due to the same cause, with carbonic acid and uric acid as the least harmful, and lactic and oxalic acids balancing the other side of the scale.

"Now in the face of all these facts a man who can defiantly and positively say uric acid in and of itself can produce rheumatism or pyorrhea, ought to readily pass for a near relative to the fellow who could hear the grass grow. . . .

---

* American Text-Book of Theory and Practice, vol. ii, page 73.

"The same is true with pyorrhea. The acid dyscrasia is not a cause, but like every other debilitating condition, it may be regarded one of the etiological factors.

"Another misunderstanding is with the formation of calculi in pyorrhea. This certainly must be a result and not a cause, unless some one can prove that the formation here is altogether different from those formed in other parts of the body. Calculi are not formed unless a foundation is laid on some nucleus, a cavity, inflamed or degenerated tissue, or some foreign substance lodging at some given point around which the deposits settle. . . . Large quantities of uric-acid crystals are found in the kidneys of the new-born, yet this condition is not considered to be of any pathological significance. . . . The murexid test showed uric acid on the peridental membrane in two cases of sound teeth that I had extracted of healthy children for correction of irregularity."

I will now ask your attention to brief extracts from a paper by Dr. M. L. Rhein, of New York (COSMOS, June, 1896), upon the "Oral Expressions of Malnutrition." He says,—

"It is very significant that the earliest manifestations resulting from malnutrition are noticed about the pericemental tissues. The gums and peridental membrane being fed by about the most remote portion of the blood tracts, it is no more than reasonable to suppose that these organs should be the first to exhibit symptoms of a lack of nourishment in their elemental corpuscles."

He cites the recent work of Levison, with conclusions as follows:

"First. Uric acid is formed in the body by the disintegration of the albuminous substances of its tissues, especially of the nuclein or nucleins.

"Second. The excretion of uric acid becomes increased or diminished by all factors (diseases, medicines, poisons, etc.) which give rise to a more rapid or slower disintegration of the cellular elements of the body, and especially of the leucocytes.

"Third. The taking of food, especially flesh food, causes a temporary leucocytosis (digestive). This leucocytosis probably arises from the nuclein of the food.

"Fourth. The amount of uric acid excreted in twenty-four hours is not influenced to a great extent by food. There is, however, this distinction noticeable: the easily digestible animal albumens set up digestive leucocytosis and formation of uric acid mnch quicker than the vegetable albumens, which are difficult to digest.

"If these investigations are of any value, they certainly show that uric-acid excess is a concomitant, not only of gout, but of various diseases, poisons, drugs, and nervous shocks. . . .

"Great importance is attached to this point in our field of work, in order to dispel the illusion that in persons affected with pyorrhea alveolaris, or erosion, where the trouble appears to be due to an increased amount of uric acid in the blood, it necessarily follows that the patient has gout. He may just as likely be suffering from tuberculosis, pneumonia, Bright's disease, neurasthenia, or perchance be under the toxic effect of some powerful drug. . . .

"The practical object of this paper is to emphasize the fact that the uric-acid dyscrasia can be associated with almost any disease accompanied by malnutrition. . . . Careful clinical observation has demonstrated to me the fact that, according to the character of the primal cause, the appearance of the inflamed gums and the character of the deposits and exudations will vary greatly, as well as the symptoms expressed by the patient. My observations on these variations are not so thorough that I can at present classify them according to their individual diseases, but I wish to have recorded the statement that the physical condition of the peridental tissues can become a great aid in differential diagnosis."

This synopsis which we give of two contributions to the etiology of this universal disease, which have appeared since our last meeting, cannot fail to attract the attention of members of this association, and should invite discussion upon their merit. The arguments offered have the true scientific timber, and are free from vague assertion.

Section VII, Anatomy, Pathology, and Surgery, was called, and Dr. TRUMAN W. BROPHY, Chicago, the chairman, reported orally that two papers would be presented by the section, by Drs. W. C. Barrett and Thomas Fillebrown, respectively.

Dr. W. C. BARRETT, Buffalo, read a paper entitled "The Orbicularis Oris and the Muscles of Expression."*

At the conclusion of the reading, Dr. Barrett called attention to a drawing of what he thinks an ideal set of artificial teeth from the anatomical standpoint. According to this idea, the labial surfaces of the teeth should never be convex, and the plate must never be kept in place by continuous suction.

Dr. THOMAS FILLEBROWN, Boston, Mass., read a paper entitled, "A Study of the Relation of the Frontal Sinus to the Antrum," which is printed in full at page 903 of the current number.

Dr. A. O. HUNT, Iowa City, Iowa, only desired to corroborate some of the statements made by Dr. Barrett in his paper, which related more especially to the functions of the orbicularis oris, as well as giving its minute anatomical relations to other muscles. This muscle has a divided function; it acts differently in the lower from the way it acts in the upper lip; thus, in speaking it moves the upper lip very slightly, but in the lower lip the function is increased. It can push the lower lip up beyond and over the upper, but it cannot push the upper over the lower. This is a confirmation of the idea expressed in the paper that the fibers do not pass around the cavity of the mouth continuously. Another peculiarity of the operation of the function of this muscle, is that it cannot lift the upper lip without everting it. You cannot move one of the muscles of expression of the face without affecting all, though they can be made by unusual training of some of them, such as the contortionist uses in the training of the muscles of the body, to perform unusual uses. We see this peculiarity also in some of the motions or habits of the muscles which are retained after the teeth are lost, and which are caused by some abnormal condition of the orbicularis oris arising through perhaps an abnormal position of some of the teeth. Thus, if the cuspid should stand outside of the arch, causing the habit of lifting the corner of the mouth, the habit will continue even after the tooth which caused it has been lost. The cuspid teeth are situated directly under the alæ of the nose, and pass down between the two sets of levator muscles, so that if there is a variation in the position of the muscles, as frequently occurs, for instance where one side of the mouth differs from the other, certain habits may be engendered which will persist after the teeth are extracted We must, therefore, study all the muscles of expression together. They all act together and constantly. In studying this question, we must take into the consideration that whether all the muscles are in their normal position has a bearing on their movements. In pleasing emotions these muscles radiate up and out from the central position ; in unpleasant emotions, down and in, which is a general fact that regulates the result. The effect of the restoration of these muscles to their normal position, after a loss of the teeth, is not always possible in the aged, except by the use of an extraordinary amount of material. Dr. Eames, some years ago, made a valuable suggestion : In cases where there is extreme resorption, not only the alveolar border is resolved, but the muscles themselves droop. Dr. Eames's suggestion was to the effect that to restore natural function in such cases, it was necessary to build up as high or higher at the point over the location of the cuspid than the impression showed, and then form in addition a hood which lifts the muscles over the cuspid and thus modifies the action of all. This building up can easily be continued, in extreme cases, to the molars, which will add in some instances to the efficacy of the result.

---

*This paper was printed in the DENTAL COSMOS for October, page 834.

Dr. CORYDON PALMER, Warren, O., had learned from Dr. John Allen in 1843 the ideas which he had formed upon this subject. He, therefore, thus early had the advantage of Dr. Allen's experience, to which he had added his own observations, and was able to show the results of their application. At that time there were no full sets of porcelain teeth to be had in the depots, and instead of being carded upon wax and convenient for selection, as they are to-day, they were shown loose in boxes. There were also no separate first and second bicuspid forms,—the one shape serving for both, and there was no finishing molar. He had suggested to Dr. S. S. White the idea of putting teeth on cards, and also of making them in entire sets, and the first full set so made that were long enough to make a whole set by giving restoration were made from his (Dr. Palmer's) models. Dr. Eames's method was faulty in making the restoration hollow. In his own studies of the subject, Dr. Palmer had endeavored to bring back exactly the lost portion, to represent it as perfectly as his art would permit, prominent where prominence was needed, and sunken where it should be sunken, and altogether to give the muscles of the face their proper curve and so bring out and restore the shape of that which was lost.

Dr. Palmer then showed the piece which he was wearing in his own mouth, which had been made by himself, and was the best model to carry out the idea he had spoken of, in existence. It had been made without ever putting a brush upon it. He had trimmed and burnished it, and he believed that better results could be obtained with rubber work in this way than in any other.

Dr. BARRETT thought that this plate would be a revelation to any one who would look at it closely. There is not a muscle that is not provided for, although Dr. Palmer had informed him that he did not know the names of half these muscles. He had, however, exactly reproduced the places for every one of them as shown on the chart.

The organization of the sections was then proceeded with, and the association adjourned until 8 o'clock P.M.

Evening Session.

The association was called to order at 8.30 P.M., and Dr. J. N. CROUSE made a statement with reference to the status of litigation conducted by the Dental Protective Association.

Dr. TRUMAN W. BROPHY, Chicago, thought the paper by Dr. Fillebrown one which would excite comment among medical men as well as in our own profession. He was persuaded that cases of the sort described occurred more frequently than is usually recognized. A case now in his own hands for treatment proves that a probe can be passed up through the maxillary sinus into the frontal sinus. The secret of success in the treatment of empyema of the antrum is perfect cleanliness. In a case now under treatment he had found that a rubber tube passed into the antrum by a surgeon for drainage, and which was supposed to have been lost out of the mouth, was really within the antrum, where it was a constant source of irritation until it was removed. Dr. Barrett's paper opens up to view a great field in prosthetic dentistry. The method of procedure which would give the best results in these cases was most beautifully illustrated by Dr. Palmer, whose plate was cut away where that course was needed, and built up where necessary, and so was exactly adapted to the muscles described by Dr. Barrett.

Dr. FRANK ABBOTT, New York, wanted to say as a corroboration of the statement by Dr. Fillebrown that there is an opening between the antrum of Highmore and the frontal sinus, that he had for a long time believed it to be the case, although he had no opportunity to thoroughly examine into the matter. He believed that in cases where the maxillary sinus is involved absolute cleanliness is what is most needed to insure a cure, but it is sometimes most difficult to obtain. To secure cleanliness he had devised an apparatus by which he can spray all over the antrum, instead of using the tube with a single vent. He uses also for drainage a mass of cotton wound upon a stick, making a new plug every time he made a treatment. He had seen plugs used similar to those described by Dr. Fillebrown, but he thought he had better results from the method which he himself used.

Dr. B. HOLLY SMITH, Baltimore, Md., said that the paper of Dr. Fillebrown's had a peculiar interest for him because it brought to mind some cases which had come under his observation in connection with the work of a specialist in the diseases of the nose and throat, where a temporary condition following an attack of grip had eventuated in the filling of the cavity of the antrum with fluid, and where there was no opening, and where recovery soon followed after the origin of the trouble was located and a proper opening made for the removal of the contents. The opening from the frontal sinus into the antrum has been verified by examination. He thought that as a class dentists were too timid. They should be bolder in their operations. In troubles of the antrum they should have proper drainage, and should enter boldly and evacuate the contents, and the trouble would clear up in a short time. He believed in the heroic operation, since he had seen cases which had been treated for six years, and in which, after operation, there resulted a cure in a few weeks.

Dr. W. C. BARRETT, Buffalo, N. Y. We all recognize the importance of the subject. He believed it to be an indisputable fact that dentists are the poorest anatomists of all those who practice the healing art, and it was unquestionable that they should have an intimate knowledge especially of the muscles of expression of the face. The horrible caricatures which frequently result from faults in prosthetic dentistry show a lack of anatomical knowledge. The dentist should study the anatomy of the muscles of the face in order that he may have practical results.

With reference to Dr. Fillebrown's paper he wished to say a few words. Last year Dr. Cryer showed at the meeting of this association a large number of slides which were a revelation to most of those present. These showed that the infundibulum discharged into the antrum, or so near the meatus that it might discharge into the antrum. The speaker had modified his practice in accordance with these ideas. We don't know what we may meet next week in the way of modifications of treatment, but he has not found a necessity for a tube in treating antral troubles. It must be an irritant, and its presence tends to break down the tissue, besides not perfectly draining the cavity. His practice is simply to make a good opening, and keep it open, if necessary cauterizing the orifice to keep it patulous. Such a paper as this calls attention to a condition which we as dentists should know all about. If the observations recorded are confirmed, it will modify practice in these cases.

Dr. JOSEPH HEAD, Philadelphia, thought that while it might be possible that no other class of practitioners had so little knowledge of anatomy as dentists, it was certainly true that one class had less knowledge of the anatomy of the mouth, and that was the general practitioner.

(To be continued.)

DENTAL SOCIETY ANNOUNCEMENTS.

MASSACHUSETTS BOARD OF REGISTRATION IN DENTISTRY.

A MEETING of the Massachusetts Board of Registration in Dentistry for the examination of candidates will be held in Boston, on Monday, December 7, 1896, at 10 A.M., at the United States Hotel.

E. V. McLEOD, *Secretary*,
New Bedford, Mass.

EDITORIAL.

PLAGIARISM.

THE Century Dictionary describes this moral disorder as "the purloining or wrongful appropriation of another's ideas, writings, artistic designs, etc., and giving these forth as one's own: Specifically the offence of taking passages from another's compositions, and publishing them, either word for word or in substance, as one's own; literary theft.'' This defines the condition with much clearness. One phase of plagiarism, that which relates to the disorder as affecting the editorial function, has been freely discussed in a number of recent dental journals, with the result that it has been shown that a dental journal has no more right to appropriate another's literary property than has an individual. In this view we heartily concur. There is a subtle flattery in having one's ideas appropriated by another, but the difficulty which arises in the case where such appropriation is the work of the plagiarist, is that no one but the originator of the idea and the literary pirate enjoy the flattery. There is a selfishness about it which the proprietor of the brains in the case is inclined to resent. We must confess to a certain feeling of satisfaction, albeit we have had to enjoy it in secret, at finding valuable ideas taken bodily from the DENTAL COSMOS, published without credit in other journals; our satisfaction has been based upon, first, the recognition implied in the ''steal'' of the value of the mental pabulum furnished by this journal, and, second, upon our faith in the practical certainty that intelligent readers will in due time discover its true origin. We have therefore been less disturbed by this kind of literary piracy than we might have otherwise been. This, however, does not alter our firm conviction as to the correctness of the axiom that the author of an idea has as much right in the ownership of his mental products as he has in the products of his muscles, or in the material things he claims as his own by reason of his vested rights therein.

The piratical journal is sufficiently contemptible, and the individual plagiarist is none the less so. They belong in the same category, but the crime in a journalistic sense has been somehow regarded as less heinous than when perpetrated by an individual, for what reason is not clear, except it be that the individuality of a journal is not so manifest as that of an author or a writer. However that may be, there should be no difference of opinion as to the gravity of the offence by whomever perpetrated, and the lovers of justice and equity should unitedly and individually resent the piratical efforts of the plagiarist as forcibly as they would the deeds of his congener, the individual who would feloniously deprive them of their material possessions.

Our attention has been directed to a case which calls for explanation, if it is to be regarded as other than a glaring example of plagiarism. When we come to think of it further, an explanation seems to be equally in order even in the event that it be a case of plagiarism. But we leave it to our readers to judge for themselves.

Following is the full text of an article printed at page 371 of the

Pacific Stomatological Gazette for August, 1896, which we republish in connection with certain portions of an article by Dr. J. D. Thomas which will be found in the Dental Cosmos of November, 1891, pp. 963–966, inclusive.

NITROUS OXIDE GAS VIEWED FROM A PRACTICAL STANDPOINT.

EXTRACTS FROM A PAPER BY JOHN D. THOMAS, D.D.S., PHILADELPHIA, PA.

(From the Dental Cosmos, Nov., 1891, pp. 963–966.)

The second class of cases which exhibits elements of danger is that of suspension of breathing. By this I do not mean the hysterical strain in people who recover with violent crying,—this is more noticeable in children, but seldom goes to a point to excite anxiety,—but the suspension of breathing from physiological causes Of these, three kinds are recognizable:

The first will take place immediately upon loss of consciousness, and is a repetition of the effects described before, where the patient, while volition lasts, has been persuaded against his will to continue breathing the gas. The sensory and motor ganglia, being as yet unaffected, will afterward carry out the feeling of resistance by a sort of mentality of their own, and breathing will cease; sometimes this persistence will continue so as almost to produce suffocation. On removing the mouth-piece and pressing a finger against the fauces he will resume respiration with a gasp, and you can proceed with the administration

The second kind consists of those who exert themselves to breathe immoderately deeply and rapidly, so that when the action of the lungs is no longer controlled by volition, breathing will cease from fatigue and rest follow involuntarily for several seconds, sometimes requiring considerable effort to bring about a resumption of the normal action. In both of these cases it is important to recognize early the cause and effect, and to apply the proper remedy promptly, remembering that while respiration is suspended the anesthetic effects are continually increasing, particularly that phase which is produced by what is known as the want of oxidation

The third state of suspension is produced legitimately by the physiological effects of the gas, and its accompanying asphyxia directly upon the nerves which control the action of the diaphragm and lungs. To my mind

SOME EXPERIENCES IN THE ADMINISTRATION OF NITROUS OXIDE GAS.

BY MAYO A. GREENLAW, D.D.S., F.S.C., SAN FRANCISCO.

(Read before the San Francisco Dental Association, August 10, 1896.)

We find when administering gas that the suspension of breathing is very uncomfortable and often distressing to the patient, and this must be overcome. I do not mean the hysterical condition affecting persons that comes from the gas, but I mean the suspension from physiological causes. I have found three causes or kinds.

The first will take place immediately on loss of consciousness, when the patient, from fear or perverseness, has been persuaded against his or her will to continue breathing the gas. While volition lasts the sensory and motor ganglia, being as yet unaffected, will carry out the feeling of resistance by a sort of mentality of their own, and breathing will cease. Sometimes this persistence will continue so as almost to produce suffocation. On removing the mouth-piece and pressing the finger against the fauces the patient will resume respiration with a gasp, and you can proceed with the administration.

The second kind consists of those who exert themselves to breathe immoderately, deeply and rapidly, so that when the action of the lungs is no longer controlled by volition, breathing will cease from fatigue, and rest follow involuntarily for several seconds, sometimes requiring considerable effort to bring about a resumption of the normal action. In both kinds it is important to recognize early the cause and effect, and to apply the proper remedy promptly, remembering that while respiration is suspended the anesthetic effects are continually increasing, particularly that phase which is produced by what is known as want of oxidation.

The third cause of suspension is produced legitimately by the physiological effects of the gas and its accompanying asphyxia directly on the nerves which control the action of the diaphragm and lungs. To my mind this condition is caused more by the apparent asphyxia or want of oxygen than

this condition is caused more by the apparent asphyxia, or want of oxygen, than by the actual effect of the gas. Of course, an excessive dose of the gas might produce this effect, as it has been reported in most of the cases of death in animals that the lungs ceased their action before the heart ceased beating; but in the cases to which I refer there will be no indication of an overdose; in fact, it will sometimes take place before the patient is sufficiently under the influence of the gas to permit of operating.	by the actual effect of the gas. Of course, an excessive dose of gas might produce this effect, as it has been reported in most of the cases of death in animals that the lungs ceased their action before the heart stops beating; but in cases to which I refer there will be no indication of an overdose—in fact, it will sometimes take place before the patient is sufficiently under the influence of the gas to permit an operation.
The appearances presented by persons in whom this phenomenon is likely to take place are sufficiently clear to excite suspicion and to put one on guard, and with these premonitory indications it is usually an easy matter to avoid the point of danger. This suspicion may be aroused by persons of dark-colored blood, as shown at the lips, and you will notice that such people take very slow and shallow inspirations naturally, showing that their blood appears already heavily charged with carbonic acid; or rather they do not breathe a sufficient amount of oxygen to relieve the blood of its accumulated carbon, and at the first inhalation the dark appearance begins to deepen. They will be in apparently good health, and as far as the lungs are concerned may be entirely free from disease, but are seemingly particularly weak in their breathing function, which will sometimes be as low as twelve or fourteen respirations to the minute. As the effects of the gas progress, the discoloration increases, the breathing grows slower and less deep, and, should you continue the administration, would cease entirely. By a wise dispensation, the admission of atmospheric air to the lungs is the great antidote for the ill effects produced by the gas in these especial cases, so if one grows sufficiently familiar with the indications preceding this effect and admits the air soon enough, respiration will be resumed and no bad result will occur	The appearance presented by patients liable to these troubles will cause the operator to be on guard to avoid any danger. As, for instance, persons with dark-colored blood, as shown at the lip, will arouse suspicion, and you will notice that such people take very slow and shallow inspirations naturally. This shows that their blood is overcharged with carbonic acid; or, I may say, they do not breathe a sufficient amount of oxygen to relieve the blood of its accumulated carbon, and at the first inhalation the dark color appears and deepens. They will, apparently, be in good health, and, as far as their lungs are concerned, may be entirely free from any disease, but are seemingly particularly weak in their breathing functions, which will sometimes be as low as twelve to fourteen respirations to the minute. And, as the gas is administered this discoloration increases, the breathing grows slower and less deep, and, should the administration be continued, would stop entirely. Now, when one becomes familiar with this condition, admission of atmospheric air to the lungs is a great antidote for the ill effects produced by the gas, in these cases especially, and all bad results avoided.
Should the respiration cease, then every effort should be made by artificial means to restore it as quickly as possible, remembering that the condition of deoxidation is in a great measure responsible for the effect; and the heart's action still going on, every second lost adds so much more to the depth of the impression on the nerves already paralyzed.	Should respiration cease, then every effort should be made by artificial respiration to restore it as quickly as possible, remembering that the condition of deoxidation is in a great measure responsible for the effect. And as the heart's action is still going on, every second lost adds so much more to the depth of the pressure on the nerves already nearly paralyzed. There are

Several methods of artificial respiration have been recommended. The idea, of course, is to get air to the lungs with as little loss of time in preparation as you can, and before resorting to other methods I would suggest that (your patient sitting in the chair with his feet resting on the footstool) you press the body forward until the chin will come as near the knees as possible. This motion will force the abdominal viscera toward the lungs, thereby emptying them of the gas ; then raise the body to the perpendicular position—keeping the tongue well forward in the mean time—and lift the head and arms, which will tend to inflation ; then again pressing forward to the knees, repeating until the blood begins to assume a red color, when the diaphragm will take up its natural action and recovery will be speedy and complete.

I have said that to my mind these effects are produced more by the accompanying deoxidation of the blood than by the direct effects of the gas ; and it is of interest that we should discuss just what the effects of the gas are and how produced.

There have been different theories upon the subject. First, it was thought to produce anesthesia by overoxidation, because of its containing another equivalent of oxygen as compared with atmospheric air ; but it has been shown that it goes into the lungs nitrous oxide and comes out the same, with a decreasing amount of carbonic acid, showing that no separation of the oxygen from the nitrogen takes place. A later theory assumed that the gas possessed no anesthetic properties in itself, but its effects were produced solely by the condition known as the want of oxidation, or deoxidation of the blood.

If such were the case, any agent which would cut off the oxygen supply would produce the same effect ; but there is nothing known that will produce a similar result in the like space of time. Probably the most nearly correct theory is, that we have a dual effect produced : one by the gas, which is as pure and legitimate an anesthetic or narcotic as any now known, and we have the accompanying effect of deoxidation, which helps to produce the anesthesia, but which is responsible for the disagreeable symptoms such as the asphyxiating appearance, violent twitching, and convulsive muscular contraction. If we

a number of methods of artificial respiration, but any that will force the gas from the lungs will answer the purpose, and so restore proper breathing.

A great many think these effects are produced more by the accompanying deoxidation of the blood than by the direct effects of the gas ; and it is of interest that we should discuss just what the effects of gas are, and how produced. There are different theories on the subject. Some claim to produce anesthesia by over-oxidation because of its containing another equivalent of oxygen as compared with atmospheric air ; but it has been shown that it goes into the lungs nitrous oxide and comes out the same, with a little less carbonic acid, showing that no separation of the oxygen from the nitrogen takes place.

A late theory has been put forth that this gas has no anesthetic properties in itself, but that its effects are produced solely by the condition known as the want of oxidation or deoxidation of the blood. Now, if such was the case, any agent cutting off the supply of oxygen would produce the same effect ; but there is nothing known that will produce this result in the same time.

Probably the most correct theory is that we have a double effect produced : one by the gas, which is as pure and legitimate an anesthetic or narcotic as any now known, and another the accompanying effect of deoxidation, which helps to produce the anesthesia, but which is responsible for the disagreeable symptoms, such as asphyxiating appearance, violent convulsive muscular contraction and twitching. Now, if this element that produces this could eliminate that which produces this condition, we would, I think, have all that could be desired in an anesthetic for dental use.

To meet this great desire, it has been suggested that the gas should be mixed with pure oxygen, or diluted with atmospheric air, but I have never learned that these efforts have proven satisfactory.

It is not admissible to previously dilute the gas with air, for the reason that you meet patients of such diverse constitutions that some will fail to come under its influence at all. There are some men who can drink an inordinate amount of whisky with impunity, while others are easily affected with half the amount or less ; so you will find it with the gas : some will require a greater quantity than others, and if it is diluted with air complete narcosis is utterly impossible.

However, the evil effects of the lack of oxygen can be mitigated very perceptibly by allowing a small amount of atmospheric air to pass through the nose and between the lips when the inhalation is about half completed ; not enough to counteract the effects of the gas, but just sufficient to supply a little oxygen to relieve the intensity of the discoloration, and herein lies the secret of avoiding the dangerous symptoms which I have endeavored to describe in the constricted glottis and suspended breathing. By so doing I have frequently administered gas in this way to the same patients without the least inclination to contraction or stoppage of respiration. In long operations, where the patient has been under the influence from three to eight or nine minutes, alternating a breath or two of the gas with one of air, there has been but the least discoloration imaginable, and none of the stertor and severe twitching which were shown where the pure gas was given. It is the knowledge of this fact which leads me to condemn the use of the hood or face-piece so much in vogue in Europe, and which I am sorry to see is recommended in this country. You want full view of the lips, so that you may see to what extent discoloration is taking place, which with the mouthpiece and face uncovered can be relieved to a great extent, and that, too, without prolonging the period of inhalation more than a breath or two.

condition could be removed, we would have one of the best anesthetics that could be desired for dental use. To meet this great desire it has been suggested that the gas should be mixed with pure oxygen or diluted with atmospheric air ; but, from what I have learned, this has not proved satisfactory. It is not admissible to dilute the gas with air, for you meet patients of such diverse constitutions that some will fail to come under the influence at all ; some will require more than others, and, if diluted with air, complete narcosis is utterly impossible. However, the evil effects of lack of oxygen can be mitigated very perceptibly by allowing a little atmospheric air to pass through the nose when inhalation is about half completed ; not enough to counteract the gas, but just enough to supply a little oxygen to relieve the discoloration, and herein lies the secret of avoiding dangerous symptoms, which may be called "constricted glottis." By so doing I have administered the gas in this way to some patients without the least inclination to stoppage of respiration.

In long operations, where the patient has been under the influence from three to eight minutes, alternating with gas and air will cause the blood to be clear of discoloration or severe twitching, which is shown where the pure gas has been given.

A great many operators prefer the simple mouth-piece to the hood-piece, as the former gives you full view of the face and lips, while the latter covers them up and you cannot have proper view of them, except by raising the hood, and where you can see the discoloration it can be relieved to a great extent, with very little trouble.

I have used both, and find the improved hood very satisfactory, as the arrangement is perfect for the admission of air at any time needed, and shutting off the supply of gas.

A comparison of these essays will be found interesting. Even a superficial inspection will show that the one of recent publication is almost a verbatim transcription of the original, which was first published in this journal.

An entire absence of quotation marks or of a line of credit for the ideas appropriated, is noticeable. This absence of quotation marks is possibly an oversight upon the part of the writer, or possibly a printer's error. In either event it is a piece of stupidity which should have been corrected in a later issue.

But a more critical examination of the California essay reveals the fact that where the writer has departed from the literal transcription of the article which he copies, and endeavors to restate in his own terms certain of the ideas therein set forth, he flounders in a morass of ignorance of the subject that would be amusing if it were not pitiable. For example, witness the use made of the phrase "while volition lasts" in the mangled reproduction from the original article, where it occurred as a printer's error. Or again, the statement, "Some claim to produce anesthesia by over-oxidation," etc. Also the following: "Probably the most correct theory is that we have a double effect produced, one by the gas . . . . and *another* the accompanying effect of deoxidation," etc. And further, "Not enough to counteract the gas, but just enough to supply a little oxygen to relieve the dangerous discoloration . . . . *which may be called constricted glottis.*" Also, "I have administered the gas in this way to *some* patients without the least inclination to stoppage of respiration."

It is gratifying to learn from this latter sentence that not all of the transcriber's patients suffered from stoppage of respiration.

This article is "rehashed" for the readers of the *Dental Digest* of September, 1896, to quote the very applicable term used by the editor of that journal in his remarks published at page 59 of the *Dental Review* of January of this year. Judged upon its internal evidence, the classification of this essay would present no difficulty. We suspend final judgment thereon in order to give any one interested an opportunity to show cause why it should not be diagnosed as a case of plagiarism complicated with stupidity; and if it is, can any one produce a finer specimen in dental literature?

In this connection we are reminded of the story of the boy who had stolen a fish, and in order to escape with his booty undetected had placed the fish inside his waistcoat, which he securely buttoned over it; the tail of the fish, however, projecting below the lower edge of the garment. A philosophical clergyman meeting the youthful criminal, and taking in the situation at a glance, volunteered to him the following sage advice: "Young man, you should either wear longer waistcoats or else steal shorter fish."

CARD FROM DR. ANDREWS.

To the Editor of the Dental Cosmos:

Sir,—In the abstract of my Atlanta address, published in the June Cosmos, I was reported to have said, "The selection of material for enamel-building," etc. The sentence should have read, "The secretion of material," etc., as it is in my original manuscript. Then there have been quotation marks placed over my own descriptions, which make them read as though they were the words of Dr. Williams. A busy man is at the mercy of type-writer and proof-reader in these somewhat hasty reports of papers. I wish to acknowledge the courtesy of Dr. Williams in having the galley-proof of his reply sent to me, and to state to him that if he had waited for the publication of the address in the *Journal of the American Medical Association*, he would have been spared the use of ridicule, which is not only discourteous, but always out of place in discussions of this kind.

I shall reply to Dr. Williams in a paper I am now writing.

Very truly yours,
R. R. Andrews.

Cambridge, October 22, 1896.

BIBLIOGRAPHICAL.

The American Text-Book of Prosthetic Dentistry. In contributions by eminent authorities. Edited by Charles J. Essig, M.D., D.D.S., Professor of Mechanical Dentistry and Metallurgy, Department of Dentistry, University of Pennsylvania, Philadelphia. In one octavo volume of 760 pages, with 983 engravings. Lea Brothers & Co., Philadelphia and New York, 1896. Price, cloth, $6.00; leather, $7.00.

The rapid growth of dentistry in all of its departments is so generally recognized that expressions of that fact have become trite not only in our literature, but everywhere that the topic is referred to. It has come to be an acknowledged condition of its growth that it should be rapid. But notwithstanding the commonplace character of this belief, it receives fresh significance and importance when an exposition of the present status of any of its departments is brought strongly into notice. The American Text-Book of Prosthetic Dentistry is a work which not only forcibly emphasizes the rapid growth of dentistry in that particular field, but is an epoch-making work which is certain to do much in developing its particular department of dentistry in the future. These views seem warranted by the novelty of the plan of the work, the character of the subject-matter, and the method by which it has been presented. As to its plan, the work is composite in authorship, each department of the subject being written by an acknowledged expert in his especial field.

The composite plan of authorship is of course not novel in itself, as it has been followed in the production of numerous works, but, as applied to the one under consideration, it is significant of the fact that not only has dentistry become specialized into its major departments, but that even in one of these the tendency to specialization has further extended to a degree which has rendered it practically impossible for any individual writer to adequately set forth the existing state of the science and art of the subject of dental prosthesis. Recognizing this, the editor and publishers have wisely adopted the plan of presenting the subject in a connected series of essays by specialists, and, by careful and systematic editing, weaving and molding them into a harmonious whole. The scope of the work is sufficiently broad to include the whole field of prosthetic dentistry. It is not meant by this that every process which could be included under that title has been embodied in the work, but that the principles set forth and clearly explained are sufficiently comprehensive to enable one who has mastered them to intelligently carry out any usual or unusual procedure which might present for performance. The work is essentially one of principles, not a voluminous agglomeration of details, and herein lies its value as a text-book. The student is made to grasp the foundation principles of his work, and these are then elaborated by typical and carefully selected examples which emphasize and indelibly stamp them upon his mind. In this respect the treatment of the subject-matter of the book is scientific and eminently practical. The arrangement of the sequence of the chapters is worthy of note in that the simpler and elementary portions of the subject are first presented, and a logical development of the more complex processes and methods is pursued.

When the enormous mass of data which is now included within the domain of dental prosthesis is considered, the editor and his collaborators are to be congratulated upon having presented all that can be regarded as really essential in so small a compass and in such an acceptable manner. As a specimen of book-making the publishers have added another to their list of text-books par excellence ; the illustrations, typography, paper, and press-work are beyond criticism. As a text-book on prosthetic dentistry it is a decided step in advance of anything which has appeared on that subject. The dedication of the work to Dr. Louis Jack is a feature which will be heartily concurred in by those competent to judge, and, in view of the excellence of the result, the dental profession of America can have no criticism upon the name, The American Text-Book of Prosthetic Dentistry, chosen for its title.

RHYMES OF THE STATES. By GARRETT NEWKIRK. Illustrated by Harry Fenn. 96 pages, bound in cloth. New York: The Century Co. Price, $1.00.

The dental profession has among its members a goodly number who have developed literary ability in fields outside the technical lines of their profession. The results of their work have been, as a rule, acceptable contributions and evinced more than ordinary literary skill. In recent years the tendency upon the part of dentists to outside literary ventures has increased, and is to be commended for the indication which it gives of the desire to combat the narrowing effect upon the mental horizon which constant working in a restricted technical field is sure to bring about when unopposed. Dr. Newkirk's Rhymes of the States is a clever and praiseworthy attempt to fix in the mind of the child certain important geographical, historical, and sociological data pertaining to the States of the Union. He has taken advantage of what is now clearly recognized as a psychological principle,—viz, that the vividness of a mental picture is *cæteris paribus* in direct proportion to the intensity of the peripheral stimuli,—*i.e.*, he has endeavored to fix his data upon the mind by appealing to several sense perceptions together, and has further enhanced the effect by presenting the matter in catchy rhythmical form.

To appeal to several perceptive faculties in association and to present a subject in such a manner as to eliminate the labor of acquiring knowledge by making the process a pleasure, is a pedagogical ideal which ought never to be lost sight of by the teacher. Dr. Newkirk's book is a delightful example of the realization of it.

◆

HINTS, QUERIES, AND COMMENTS.

CATAPHORESIS.—It was my pleasure, last April, to give a clinic before the Cincinnati Academy of Medicine, demonstrating cataphoresis for the anesthetizing of dental pulps. At that time my experience was very limited, having recently returned from New York, where this method of producing anesthesia was yet in its infancy. Since then I have daily put into practice cataphoresis, with results far beyond expectation. From April 1 to July 15 I have used this method wherever the case demanded it, and at no time have I met with a failure to bring about the desired result. Where, heretofore, patients have entered my office with a fear of the torturing pain so soon to follow and so often to be repeated, they now greet me with smiling faces, having full confidence in that wonderful power *electricity* and soothing drug *cocain*, which will carry them through an operation as painlessly as chloroform or ether will under the surgeon's knife. Not only has it proved a great source of gratification to my patients, but to me also has it brought relief to my nervous system. No dentist of scruple can give pain without in a measure feeling it, and after a year of close application to office work and confinement his nervous system will show signs of weakening.

At the time of my clinic, the patient (a physician) was selected, as this physician was in the habit of taking chloroform whenever his teeth were operated upon, for the reason that he could not endure the pain without using some anesthetic. Like many physicians, he was nervous and skeptical, being fearful of cocain poisoning, and hence imagined he felt the systemic effects of the drug, when in reality he was mistaken. Cocain applied cataphorically has been proven to have no systemic effects, but is entirely local in its action. Apply cocain by cataphoresis to a central incisor, and the adjoining central or lateral will be as sensitive as if no application had been made. I can say, however, from my practical experience, that the gum immediately surrounding the anesthetized tooth is less sensitive than normal. It has also been my observation (although writers on this subject fail to make mention of it) that when a pulp is completely anesthetized, that tooth takes on the appearance of a devitalized tooth,—namely, the tooth becomes darker; and when drilled, seems dry (pulverizing, so to speak), the dentine giving off the odor of dead bone when cut or filed. I have also observed that any slight oozing of blood from the gum immediately surrounding the tooth to be anesthetized stops upon using cataphoresis. To test the power of cataphoresis I have used a red hot instrument over a pulp scarcely covered with a thin layer of dentine, and no response was given; I have gone further and drilled into pulps which I wished to devitalize and in some cases no response was made, in others only a trifle.

Where I wish to devitalize a pulp by means of an arsenical application and do it painlessly, I first use cataphoresis. then drill into the pulp and apply arsenic. Cases have come into my office suffering intense pain from both acute and chronic pericementitis and alveolar abscess, which I have relieved by direct application of cocain to the gum by means of cataphoresis; and in other cases, where I wished rapid absorption, I have applied tincture of iodin the same way and obtained excellent results. Patients have come to me where they could not only not bite down on a sensitive tooth, but could not endure the pressure of the tongue against it, and within fifteen minutes I have seen those same patients leave my office relieved.

I wish to call attention to one case, Mrs. P., who suddenly suffered the loss of her husband and became nervously prostrated. This lady informed me that formerly she had suffered considerably while having her teeth attended to. Now that she was nervously prostrated she felt unable to endure pain, and left her teeth to decay. When I saw her, her teeth were a complete wreck, and by means of cataphoresis, followed by the introduction of forty gold fillings, I was able to restore her teeth once again to usefulness. And so I can go on and relate case after case. I used a thirty per cent. solution of cocain.

The greatest objection to cataphoresis has been the time consumed in its application, which at first occupied anywhere from thirty to forty minutes. After becoming more familiar with this method, I was able to cut down the time to thirty, twenty, fifteen, and twelve minutes, according to the patient and tooth. I was then using the Van Woert cataphoric battery.

Since my return from the East, beginning September 1, I have employed the Wheeler apparatus, which I find more powerful and delicate, and it has given better results by far, as I am now able to anesthetize in fifteen, twelve, ten, seven, and five minutes. Thus the time consumed in anesthetizing is more than made up for in the rapidity and ease with which one can operate.

The duration of anesthesia varies in different cases, lasting from one-half to six and eight hours. I have opened up a tooth, operated all morning, continued during the same afternoon until about 5 P.M., and still found strong traces of anesthesia. The only time it is a disadvantage is in small and inexpensive fillings, but we owe it to our patients to relieve them of all suffering possible, if we would be classed as honorable and intelligent practitioners. Many a sensitive tooth, although all precautions be taken to protect the pulp by capping, responds to the constant malleting, becomes inflamed, remaining so from twenty-four to thirty-six hours, and frequently ends in suppuration. Such a tooth could be saved by first using cataphoresis, thus placing the pulp in a non-sensitive condition.

I have heard the cry, "You do not know what evil may follow to the tooth." Dr. Gillett gave the method a thorough test and had no bad results. I have yet to find a case where the result has not been favorable. Under cataphoresis I have built up with gold teeth so badly shattered that there remained only part of the labial and palatal or lingual and buccal surfaces. Again, you are not called upon to let your sympathy and better nature get the best of you and yield here a little and there a little to the appeals of your suffering patient, but you go boldly ahead and remove the sensitive dentine, breaking down the weak enamel-walls until you are well satisfied that you have a strong foundation upon which to construct your work. In my own practice I have seen many a tooth of this nature restored, having first used cataphoresis, and had no bad result to follow, not even the slightest inflammation, and I am convinced that with all due care the same teeth would have become inflamed from constant malleting, if not anesthetized. So instead of anticipating any evil, I rather look for favorable action.

As regards its action in bleaching teeth, I can only speak from limited experience. I used the Van Woert system in several cases with fairly good results. Have not yet tried the Wheeler apparatus. The danger of cataphoresis lies not in its application to the patient, but in the ease and boldness with which a dentist can operate. If a dentist be careless he could easily penetrate or expose the pulp. Not eliciting any pain, he might be careless and not protect the pulp. Another great advantage found in cataphoresis is all freedom from pain when finishing off a filling with disks, strips, stones, etc. I have found the larger the cavity and the softer the dentine, the more readily will cocain be transmitted.—A. I. F. BUXBAUM, M.D., D.D.S., Cincinnati, Ohio.

HEMORRHAGE AFTER TOOTH-EXTRACTION.—I should like briefly to make known a simple method of stopping continued bleeding after extraction of teeth, which has proved quite effectual in my hands in several cases, in some of which plugging, various styptics, the actual cautery, etc., had been tried without success. It consists in passing a double silk thread through both sides of the torn gum, either with an ordinary curved needle, or a handled needle, and then tying firmly over the alveolar border. In none of the cases in which this method has been employed has it failed to stop the bleeding immediately and permanently. The stitch may be removed at the end of forty-eight hours. The merely temporary success or complete failure of the usual methods, and the perfect success of that described, lead me to think it may prove generally serviceable in what is frequently a very troublesome, if not dangerous form of hemorrhage.—*Dr. James McNaught.*

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

The abbreviations of titles used are those common to bibliographical work, and will, it is presumed, be readily comprehended by any one familiar with dental or scientific publications. Any explanation will be gladly furnished by the compiler. A star (*) indicates a Thesis.

Bosworth (F. H.) A text-book of diseases of the nose and throat. New York, 1896, W. Wood & Comp., xix, 814 pp., 7 pl. 8°.

Colyer (J. F.) Extraction of teeth. London, 1896, Claudius Ash & Sons, Limited.

Schwartz (E.) Catalogue descriptif des dents naturelles et des moulages présentés à l'exposition de Montpellier. Nimes, 1896, 20 p. 8°.

Transactions of the American Dental Association at the thirty-fifth Annual Session, held at Asbury Park, N. J., commencing on the 6th day of August, 1895. Philadelphia, 1896, The S. S. White Dental Manufacturing Co., 380 pp. 8°.

Abbott (F.) Development of teeth and the effects of irritation upon them. Tr. Am. Dent. Ass., 1895, Phila., 1896, xxxv, 250-273.—**Addenbrooke** (W. J.) Artificial dentures. Welch's Month., Phila., 1896, i, 71-73.—**Allard.** Du traitement des sinusites maxillaires par les instillations. Rev. prat. d. trav. de méd., Par., 1896, liii, 275.—**Allen** (C. A.) Concerning vulcanite. Dental Cosmos, Phila., 1896, xxxviii, 727-730.—**Ambler** (H. L.) Journal articles pertaining to operative dentistry. [for the past year.] Tr. Am. Dent. Ass., 1895, Phila., 1896, xxxv, 247.—**Arrington** (B. F.) Pyorrhea—a criticism. South. Dent. J., Atlanta, 1896, xv, 361-364.—**Asay** (J. L.) Congenital deficiency of enamel. Pacific Stomat. Gaz., San Fran., 1896, iv, 368-371.—**Babinski** (J.) Hémiatrophie de la langue. Bull. et mém. Soc. méd. d. hôp. de Par., 1896, 3. s., xiii, 671-675.—**Barker** (A. D.) Gold filling, with special points for hand pressure. Dental Cosmos, Phila., 1896, xxxviii, 730-732.—**Benson** (J. H. P.) Dental hygiene in our schools and colleges. [Abstr.] *Ibid.:* 773-777.—**Bethel** (L. P.) Lining root-canals. Dental Reg., Cincin., 1896, l, 417-422.—**Birot de la Pommerave** (A.) Accidents survenus à la suite d'une injection faible de Cocaïne. Rev. Odontol., Par., 1896, xxxix, 346-350.—**Brophy** (T. W.) A new method of closing the soft palate. Tr. Am. Dent. Ass., 1895, Phila., 1896, xxxv, 342-344.—**Brown** (Charles De C.) [1817-1896.] (Obituary.) Dental Cosmos, Phila., 1896, xxxviii, 789.—**Bryan** (L. C.) The new mat gold. Tr. Am. Dent. Ass., 1895, Phila., 1896, xxxv, 211-213—**Burchard** (H. H.) Some principles of bridge-work. *Ibid;* 349-355.—**Cassidy** (J. S.) Materia medica and therapeutics. Dental Reg., Cincin., 1896, l, 422-427.—**Cataphoresis** [a compilation.] Dent. Rec., Lond., 1896, xvi, 342-352.—**Caush** (D. E.) Exostosis. *Ibid:* 337-342, 2 l.—**Chappell** (W. F.) Primary and secondary pharyngeal tuberculosis from a clinical standpoint. N. York M. J., 1896, lxiv, 377-379.—**Chilson** (W. H.) Dental ethics. Dental Rev., Chicago, 1896, x, 640-644.—**Clevenger** (W. F.) The importance of early recognition and treatment of adenoid hypertrophy. Indiana M. J., Indianap., 1896-7, xv, 48.—**Clifford** (E. L.) The care of the teeth in children. Medicine, Detroit, 1896, ii, 725-731.—**Cobb** (J. P.) Dentition, indigestion and eczema, their etiological relationship. St. Louis J. Homœop., 1896, ii, 344-347.—**Cool** (R. H.) Popular dissemination of dental knowledge. Pacific Stomat. Gaz., San Fran., 1896, iv, 345-353.—**Coolidge** (A.) The control of hæmorrhage in some operations on the nose and throat. N. York M. J., 1896, lxiv, 350-354.—**Couetoux.** Des adhérences du voile du palais. Ann. d mal. de l'oreille, du larynx [etc.], Par., 1896, xxii, pt. 2, 204-206.—**Coulter** (J. H.) Late syphilitic manifestations in the pharynx. Peoria M. J., 1896, i, 365-370.—**Cowie** (C. G.) Epistaxis: dislocation of jaw. Brit. M. J., Lond., 1896, ii, 749.—**Cryer** (M. H.) Studies of the maxillary bones. Tr. Am. Dent. Ass., 1895, Phila., 1896, xxxv, 295-334. [Discussion], 334-341.—**Dabney** (S. G.) Tuberculosis of the tongue. Am. Therapist, N. Y., 1896-7, v, 31.—**De Trey** (E.) A statement of facts relating to mat sponge crystal gold, called "solila." Tr. Am. Dent. Ass., 1895, Phila., 1896, xxxv, 214-216.—**Donnally** (W.) An opportunity for a great national museum. *Ibid:* 134-145. [Discussion], 146-149. ——— Treatment of oral acidity with milk of magnesia. Dental Cosmos, Phila., 1896, xxxviii, 767-771.—**Englisch** (J.) Ueber tuberculöse Entzündung des Unterkieferknochens. Jahrb. d. Wien. k. k. Krankenanst. 1894, Wien. u. Leipz., 1896, iii, 851-861.—**Farlow** (J. W.) A case of myxœdema of the throat. N. York M. J., 1896, lxiv, 421.—**Feulard** (H.) Stigmates de syphilis héréditaire; cicatrices labiales, kératite, altérations dentaires. Bull. Soc. franç de dermat. et syph., Par., 1896, vii, 448-450.—**Fillebrown** (T.) History of the discovery of modern anesthesia. Tr. Am. Dent. Ass., 1895, Phila., 1896, xxxv, 358-368.—**Fleury.** Loss of two teeth by a rubber ring. [Transl. from the French.] Brit. J. Dent. Sc., Lond., 1896, xxxix, 781-783.—**Freeman** (S.) The use of compressed air in operative dentistry. Tr. Am. Dent. Ass., 1895, Phila., 1896, xxxv, 219-227.—**French** (T. R.) The relation of chronic diseases of the nose and throat to disorders of digestion. N. York M. J., 1896, lxiv, 356-359.—**Futterer** (G.) Salivary calculi. Med. Standard, Chicago, 1896, xviii, 254-257.—**Garretson** (J. E.) The application of anesthesia to surgery, and its benefits to mankind. Tr. Am. Dent. Ass., 1895, Phila., 1896, xxxv, 369-375.—**Gillett** (H. W.) Cataphoresis for obtunding sensitive dentine. *Ibid:* 228-233.—**Grant** (J. H.) The importance of dentistry. Texas Dent. J., Dallas, 1896, xiv, 78-84.—**Greenlaw** (M. A.) Some experiences in the administration of nitrous oxide gas. Pacific Dermat Gaz., San Fran., 1896, iv, 371-374.—**Guidi** (G.) Ueber Soor, seine Mykologie und Metastasenbildung. Wien. med. Bl., 1896, xix, 371; 390; 406; 422; 436; 453; 468; 485; 501; 533.—**Guilford** (S. H.) Report of special committee on dental nomenclature. Tr. Am. Dent. Ass., 1895, Phila., 1896, xxxv, 95-120.—**Harlan** (A. W.) Antiseptic dental surgery. *Ibid:* 45-50.—**Haworth** (E. B.) Some remarks upon epithelioma of the tongue, more especially with reference to the necessity for early and radical operative interference. Pittsburgh M. Rev., 1896, x, 240-243.—**Henderson** (G. D.) The Royal Dental College. Welch's Month., Phila., 1896, i, 68-70.—**Hessler.** Eine Modification des Schütz'schen Pharynxtonsillotoms. Deutsche med. Wchnschr., Leipz. u. Berl., 1896, xxii, 596.—**Hiatt** (N. W.) Necrosis. Ohio Dent. J., Toledo, 1896, xvi, 431-433.—**Hounsell** (L. S.) A case of septicæmia, the result of alveolar abscess. Dental Rec., Lond., 1896, xvi, 385-387.—**Hubbard** (T.) Epithelioma of the soft palate removed by injections of liquor potassæ. N. York M. J., 1896, lxiv, 361.—**Hunt** (G. E.) A suggestion about cocain. Tr. Am. Dent. Ass., 1895, Phila., 1896, xxxv, 285.—**Hunt** (R. F.) The dental profession: some points in its history, its present status and relations, and its responsibilities and duties. Dental Cosmos, Phila., 1896, xxxviii, 777-783.—**Jack** (L.) The struggle for professional life and its relations with practice. Tr. Am. Dent. Ass., 1895, Phila., 1896, xxxv, 168-172.—**Jarre** (V.) De la valeur de l'examen de la bouche dans le choix d'une nourrice. [*From:* Semaine méd., Par., 1896, xvi.] Arch. de gynéc. et de tocol., Par., 1896, xxiii, 572-578.—**Kidder** (Augustus S.) [1840-1896.] (Obituary.) Dental Cosmos, Phila., 1896, xxxviii, 790.—**Kiesel** (H.) Eucaine hydrochlorate. Internat. Dent. J., N. Y. & Phila., 1896, xvii, 576-580.—**Latham** (Vida A.) A case of diffused non-suppurative lymphadenitis of dental origin. Tr. Am. Dent. Ass., 1895, Phila., 1896, xxxv, 274-279.—**Lee** (T. E.) Brisk rubbing *vs.* gingerly treatment of the gums. Welch's Month., Phila., 1896, i, 65-68.—**Lett** (I.) Stomatitis the cause of various throat-diseases. Dental Cosmos, Phila., 1896, xxxviii, 734.—**Lewis** (E. R.) Lingual tonsils. Laryngoscope, St. Louis, 1896, i, 29-32.—**Lucas** (A.) Dentigerous cyst of the superior maxilla. Birmingh. M. Rev., 1896, xl, 173.—**Meyer** (S.) Durchschneidungsversuche am Nervus Glosso-pharyngeus. Arch. f. mikr. Anat., Bonn, 1896, xlviii, 143-145.—**Miller** (R. B.) Primary erysipelas of the pharynx. N. York M. J., 1896, lxiv, 331.—**Molyneaux** (G.) Supplemental report on prosthetic nomenclature. Tr. Am. Dent. Ass., 1895, Phila., 1896, xxxv, 121-123.—**Moon** (O. C.) A case of maxillary fracture. Dental Rev., Chicago, 1896, x, 630-633.—**Neumann** (I.) Ueber Syphilis der Parotis und der Glandula sublingualis. Jahrb. d. Wien. k. k. Krankenanst. 1894, Wien. u. Leipz., 1896, iii, 609-614.—**Nichols** (J. E. H.) The sequelæ of syphilis in the pharynx and their treatment. N. York M. J., 1896, lxiv, 418-420.—**Nielson** (S. A.) Some points in the management of enamel margins. Dental Rev., Chicago, 1896, x, 633-635.—**Nixon** (A. P.) Pulp treatment and root filling. Brit. J. Dent. Sc., Lond., 1896, xxxix, 773-781.—**Ottofy** (L.) Dental education, literature, and nomenclature. Tr. Am. Dent. Ass., 1895, Phila., 1896, xxxv, 51-56.—**Palmer** (H. A.) Peridental inflammation. Dental Rev., Chicago, 1896, x, 620-623.—**Palmer** (S. B.) Evolution in operative dentistry from the electro-chemical standpoint. Tr. Am. Dent. Ass., 1895, Phila., 1896, 234-246.—**Parisot.** Sarcome du maxillaire supérieur; ablation; guérison. J. d. sc. méd. de Lille, 1896, ii, 228-230.—**Patterson** (J. D.) The necessity of, and methods for, better pulp-protection in filling teeth. Tr. Am. Dent. Ass., 1895, Phila., 1896, xxxv, 182-186. [Discussion], 186-208.—**Peck** (A. H.) Abscesses, their cause and treatment. Dental Rev., Chicago, 1896, x, 623-630.—**Purcer** (C.) A case of pharyngomycosis leptothriciæ. Australas. M. Gaz., Sydney, 1896, xv, 95-98.—**Rankin** (D. N.) A case of gunshot wound of the pharynx. N. York M. J., 1896, lxiv, 359.—**Report** of special committee on the history of the classification of dentists by the Census Bureau for the eleventh census. Tr. Am. Dent. Ass., 1895, Phila, 1896, xxxv, 150–167.—**Rey.** Inflammation purulente du sinus maxillaire ou antre d'Highmore. Courrier méd, Par., 1896, xlvi, 271.—**Rice** (G. B.) Hypertrophy of the third tonsil. N. Eng. M. Gaz, Bost., 1896, xxxi, 368–373.—**Richards** (G. L.) Nasal obstructions which result in mouth breathing, with special reference to adenoid vegetations. Internat. Dent. J., N. Y. & Phila., 1896, xvii, 549–559.—**Rickenbach** (J. F.) Abscess of the antrum. Pittsburgh M. Rev., 1896, x, 245.—**Riedel.** Ueber Phosphornekrose; die Entfernung des Oberkiefers vom Munde aus. Verhandl. d. deutsch Gesellsch. f. Chir., Berl., 1896, xxv, pt. ii, 485–509.—**Roberts** (W. O.) Practical use of the x-rays; sarcomatous tumor in the pharynx. Cincin. M. J., 1896, xi, 470–472.—**Rollins** (W.) Dental uses for Röntgen's discovery.—support for tube. Internat. Dent. J., N. Y. & Phila., 1896, xvii, 559.—**Rose** (H.) Dental mechanics.—How to construct a partial upper strengthened gold plate. Brit. J. Dent. Sc., Lond., 1896, xxxix, 769–772.—**Rostovtseff** (M. I.) [Closure of defective anterior wall of antrum of Highmore (after removal of cancerous new-growth) by skin flap.] Bolintsch. gaz. Botkina, St. Petersb., 1896, vii, 601–605.—**Roughton** (E. W.) Cancer of the tongue. Brit. J. Dent. Sci., Lond., 1896, lxxxix, 721–728.—**Rushton** (W.) How to make a small furnace far baking porcelain. *Ibid:* 817–819.—**Sauvez.** Du coryl. Progrès Dent, Par., 1896, xxiii 225–228.—**Schlesinger** (E.) Die Tuberkulose der Tonsillen bei Kindern. Berl. Klinik, 1896, Hft. 99, 1–21.—**Shields** (N. T.) Scientific filling of difficult roots. Tr. Am. Dent. Ass., 1895, Phila., 1896, xxxv, 217.—**Smith** (C. Cutler.) [1847–1896.] (Obituary.) Dental Cosmos, Phila., 1896, xxxviii, 790.—**Smith** (D. D.) The office and eccentricities of the dental pulp. Tr. Am. Dent. Ass., 1895, Phila., 1896, xxxv, 176–181.—**Smith** (F. M.) How shall we make our local societies more attractive and helpful? Dental Cosmos, Phila., 1896, xxxviii, 723–727.—**Solly** (E.) Fracture of both superior maxillæ. Brit. M. J., Lond., 1896, ii, 750.—**Somers** (L. S.) The use of menthol in pharyngitis. Laryngoscope, St. Louis, 1896, i, 78–82.—**Spencer** (H. C.) A new device in crown- and bridge-work. Dental Cosmos, Phila., 1896, xxxviii, 732–734.—**Stainton** (C. W.) Ought the formation of dental schools to be limited? Tr. Am. Dent. Ass., 1895, Phila., 1896, xxxv, 57–68. [Discussion], 79–94. ——— An apparent case of salivation. Internat. Dent. J., N. Y. & Phila., 1896, xvii, 561–563.—**Straight** (H. S.) Unresolved amygdalitis. N. York M. J., 1896, lxiv, 414–416.—**Strobell** (C. W.) Painless surgery by Schleich's method; with report of a series of cases. Am. Med.-Surg. Bull., N. Y., 1896, x, 235–237.—**Thompson** (A. H.) A basis for dental nomenclature. Tr. Am. Dent. Ass., 1895, Phila., 1896, xxxv, 124–126. [Discussion], 126–133.—**de Terra** (P.) Salubrol, a substitute for iodoform. [*Transl.*] Internat. Dent. J., N. Y. & Phila., 1896, xvii, 566–572.—**Trueman** (W. H.) The advent of dental science in the United States. Dental Cosmos, Phila., 1896, xxxviii, 713–723.—**Truillet.** Ictiosis lingual mercurial (?). Gac. san. de Barcel., 1896, viii, 282–285.—**Twilley** (W. S.) Dentistry, practical and theoretical. Internat. Dent. J., N. Y. & Phila., 1896, xvii, 563–566.—**Varley** (E. W.) The shrinkage and swelling of alloy. Welch's Month., Phila., 1896, i, 73.—**Vinci** (G.) Eucaine hydrochlorate, a new local anæsthetic. [*Transl.*] Internat. Dent. J., N. Y. & Phila., 1896, xvii, 572–576.—**Waye** (E. J.) Amalgam and its manipulation. Ohio Dent. J., Toledo, 1896, xvi, 410–412.—**Wenker** (R. J.) Dental anatomy in its relation to crown and bridge work. Dental Rev., Chicago, 1896, x, 644–649.—**Woodward** (M. F.) On the teeth of the marsupialia, with especial reference to the premilk dentition. Anat. Anz., Jena, 1896, xii, 281–291.—**Wright** (J.) Tuberculous infection of the lymphoid tissue in the pharynx, with some remarks on laryngeal infection. N. York M. J., 1896, lxiv, 412–414.

◆

LIST OF UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING SEPTEMBER, 1896.

September 1.—No. 566,948, to WILLIAM E. WALKER. Dental facial clinometer.
" " No. 566,949, to WILLIAM E. WALKER. Dental articulator.
" " No. 566,950, to WILLIAM E. WALKER. Dental articulator.
" *15.*—No. 567,589, to E. M. FREDERICKS. Dental excavator.
" " No. 567,942, to J. P. HENDRICK, JR. Tooth-powder box.
" *22.*—No. 568,129, to P. J. DAVIS. Vulcanizing apparatus.
" " No. 568,163, to T. E. DAUGHERTY. Drip apparatus for dental engines.

THE

DENTAL COSMOS.

VOL. XXXVIII. PHILADELPHIA, DECEMBER, 1896. NO. 12.

ORIGINAL COMMUNICATIONS.

THE PHYSICAL PROPERTIES OF THE SILVER-TIN AMALGAMS.

BY G. V. BLACK, M.D., D.D.S., SC.D., JACKSONVILLE, ILL.

IN the COSMOS of July and of August, 1895, and of January, 1896, I published studies of the silver-tin amalgams as found among dental supplies. The article in the July issue, 1895, was devoted to the study of the *flow* of amalgams; and, but for the fact that the flow has since been found to be in some degree modified by *conditions* then undiscovered, the studies then given might be regarded as conclusive and final. No discoveries have since been made that modify the general facts and principles then given in any essential particulars further than the degree in which this property is influenced by what is known as ageing, and the differences that are due to formulæ. These modifications appear in the exhibits accompanying this paper. The article in the August issue, 1895, was devoted to the study of the shrinkage and expansion of the silver-tin amalgams. This must now be regarded as a primary study of what has proved to be a most intricate and difficult subject. The instrumental facts then given have not been modified in any degree by further studies, but have been confirmed at every turn in the progress of the work. However, discoveries have since been made that put many questions in a very different light from that in which they then appeared, and explain much that then seemed obscure and contradictory.

The article in the January issue, 1896, was an announcement of the discovery of the effects on shrinkage and expansion accompanying that peculiar change produced by *time* elapsing after alloys are cut—known as "*ageing*." In this the results produced by artificial ageing were given for a number of formulæ; enough to show with a fair degree of certainty that the effect was universal, but differing in degree with different formulæ. In this study of the effects of ageing, together with the conditions under which the ageing occurred, it seemed to be demonstrated that what had been known as ageing was a slight oxidation of the cut alloy by which its chemical relations to mercury were profoundly changed. The change is such that when an alloy is made into an amalgam immediately after being cut, and is found not to shrink, or may expand, it will be found to shrink after the ageing has occurred. This has been most abundantly confirmed by further studies in so far as the production of shrinkage is concerned. The instrumental facts were right, but my deductions were wrong.

Under the supposition that the change in the physical or chemical condition of cut alloys was brought about by oxidation, I went about the study of the more intimate conditions of its occurrence and the means of its prevention. Before leaving the subject last fall, preparations were made for an extended study of the process of ageing and its results after I should have completed my winter's course of school work. To that end freshly-cut alloys of known formulæ, alloys made for the purpose by some of our best manufacturers, were put aside protected in various ways, and exposed in various ways, in order to test the effects of time under the various conditions. The end and aim of this work was to find the means of keeping cut alloys in good condition for use, for it was certain that by the mode of handling in vogue there could be no certainty that an alloy sent out in good condition by the manufacturer would reach his customer in suitable condition for filling teeth.

Alloys were put up in corked bottles; in long tubes partly filled, corked with cotton and inverted, so that with every change of temperature the air would be drawn in and forced out through the cut alloy. This was to obtain the full effect of contact with the air without contamination with dust. Alloys were put up in glass tubes packed full and hermetically sealed. Some of these were protected from light by wrapping in tin foil; some were exposed freely to the light; and some were kept in an ordinary drawer without especial precautions. Some were hermetically sealed in large tubes that were damp and but partly filled with alloy, so that it should be constantly in contact with moisture.

In the selection of formulæ for this work I chose silver 65, tin 35, as the one with which all experiments were to be made; but several other formulæ were put up for purposes of comparison. This selection was made for the reason that among the alloys I had used, this, when fresh-cut, was closest to what was wanted in shrinkage and expansion; it was the alloy with which I was best acquainted in experimental work, and it seemed to be very reliable. It seemed to be desirable that experiments of the nature of those that I was now undertaking should be done with one material. It was thought necessary, however, to have the accompaniment of a sufficient number of other formulæ to determine whether or not any laws discovered applied to alloys generally. These alloys were put up at intervals from the middle of October, 1895, to the end of the first week in January, 1896.

In the mean time the instruments for the work had been improved. These were fully described in my articles last summer, so that I need not now take up space with a description of them. The special micrometer was, in a measure, rebuilt, and the dial was enlarged from five inches in the old, to twelve inches in the new instrument; the space markings made wider, and some additional appliances were added to promote ease of working and accuracy of results. But in all essential particulars it is the same instrument. The binocular microscope is used in conjunction with the micrometer as before, and the instruments for the determination of flow and crushing stress are the same.

The unit of measurement is one-ten-thousandth of an inch, as in the studies of last year. This is a long term to write and takes up much space, and I have formed the habit of using the term *point* instead in my notes, and will do the same here. The value of the term "point," as I shall use it, is one-ten-thousandth of an inch. Its relative value in shrinkages or expansions is one in three thousand, lineal measurement.

About the middle of March of this year the examination of the alloys put up last fall was begun. For the want of space I cannot give tabulations of the work done on the alloys put up last fall, or of the general work done since. My notes of the work done this summer cover more than five hundred large letter-size pages; and I must give it mostly in outline, omitting all except the most essential points of detail. Indeed, it seems to me that most of it will be best given in this way, rather than to attempt to follow the work consecutively. A number of kinds of experiment were often proceeding together, and these must be given separately. The object sought in this paper will be to present a general view of the work and its results rather than a detailed report.

The first tests were made of the alloys in the hermetically sealed tubes. These were broken one by one, and test fillings immediately made. Those put up in October gave a shrinkage of five points. Those put up in the first week in January gave a shrinkage of two points. Those that were put up damp gave the same results as those put up dry. Those fully exposed to the light gave the same results as those excluded from the light. Turning now to those put up in corked bottles, I again found the results the same as from the alloys put up in the sealed tubes. Those put up in October gave five points shrinkage, while those put up in January gave two points shrinkage. Those put up in inverted tubes so as to be exposed to frequent changes of air showed no difference from those that were put up in corked bottles, or hermetically sealed tubes. Tubes put up in November and December gave intermediate results. In giving these statements I do not wish to be understood that my instruments gave positively the same result for every filling, for that is closer work than I can do for such a number of fillings, but that five points was the general result for the older alloys, and two points for those that had been put up the shorter time. But the variations did not exceed one point, and did not attach to any one of the modes of keeping. Practically the results were uniform.

Interspersed with these tests, fresh cuttings were made from portions of the ingots from which the alloys had come; and these uniformly gave the same results as in the previous tests, an expansion of one and two points. Alloys laid away in the ingot seem to suffer no change.

It so happened that in putting up the last of the alloys in January the drawer that I had devoted to this work became over-full, and I removed a number of duplicate tubes and placed them in a case in an adjoining room. In the test of these I was surprised by a shrinkage of eight and nine points, instead of two points, as had occurred with those kept in the drawer in my desk.

These results were very perplexing. Probably no man undertakes such a series of experiments without some idea in his mind as to what the outcome will be, unfortunate as such preconceptions may be. In this case I had not obtained any of the results that I had expected. Everything had gone wrong, or in a way that had not been expected. Instead of demonstrating that cut alloys could be kept fresh by excluding oxygen, it seemed to be demonstrated that the exclusion of oxygen made no difference whatever. And another element came in, in that the tubes of alloy placed in another room suffered a greater change than those kept in the drawer in my desk. These were duplicates of the tubes of alloy in my drawer. They were cut from the same ingots; sifted together; and put up in tubes of the same kind, at the same time, and under like conditions. They were in corked bottles and in hermetically sealed tubes. The freshly cut alloy gave an expansion of one point; the tubes in the drawer gave a shrinkage of two points; those placed in the case in the other room gave a shrinkage of eight and nine points. Why this difference?

So far as I could learn, there could be no other difference than the difference in the temperature of the rooms. They are two large rooms, usually thrown into one by large sliding doors. My desk is in the most remote part from the heater; indeed, the heater is in the other room. Now, during my absence from home from the 8th of January to the 10th of March, these sliding doors were closed, and the room where my desk was was abandoned to the winter's cold. Furthermore, the case in which the tubes were placed was very near the heater, so that they would often become very warm. The difference, then, was purely that of temperature. I could find nothing else whatever. I determined, however, to probe the theory of oxidation to the bottom once for all, and went about more effective measures. Oxygen was not absolutely excluded from the hermetically sealed tubes, though its amount was very small. Securing some glass tubes one-half inch in diameter inside, I drew long thin necks at each end of the tubes, the body of which was left four or five inches long; and arranged to connect these with chemical apparatus for the generation and purification of such gases as I might wish to use. Now, fresh ingots of alloy were cut, and the cuttings immediately placed in the glass tubes. The apparatus being previously charged and arranged for the generation of the gas, the tube containing the alloy was attached by rubber tubing, and the gas passed through the alloy in a stream until the removal of all air was assured. The tube was then hermetically sealed at both ends by the use of a blow-pipe before it was disconnected from the apparatus. A number of tubes were filled in this way, the gases used being hydrogen in some, nitrogen in some, and oxygen in others. Duplicates of these were laid away to test the effects of time, and other duplicates were tested at once by artificial ageing.

The artificial ageing was done by placing the hermetically sealed tubes in boiling water for ten minutes. The alloy used was silver 65, tin 35, which, fresh-cut, gave an expansion of one point. Tests of each ingot fresh-cut were never neglected. The result from the ageings was substantially nine points in each case; the hydrogen tubes, the nitrogen tubes, and the oxygen tubes giving like results. This was repeated again and again, but there was no difference in results.

Still not fully satisfied, I arranged the chemical apparatus in connection with the machine for cutting the alloy in such a way that the gas, after passing through the tube to receive the alloy, issued into a hood that surrounded the cutter, and then, the machine being put in motion, the cuttings fell directly into the tube filled with the gas without having been exposed to the air at all. These tubes were also sealed before being disconnected with the apparatus. In this experiment hydrogen, nitrogen, and oxygen were used as before. All of the tubes gave substantially the same result, a shrinkage of nine points.

This is the same shrinkage that occurs regularly when the ageing is done in an open tube, the alloy being in full contact with the air. The sealed tubes, with the alloy in each of the three gases named, when tested two months later together with the same alloy put up in a corked bottle as a control, each gave like results. It is therefore shown that the change in the alloy is not dependent on the presence or absence of oxygen. Oxidation has nothing to do with it. *It is not a chemical agent acting upon the alloy from without.*

While these tests were in progress I had also put up alloys in fluids that contain no oxygen, choosing for the purpose highly evaporable substances that would be removed by evaporation while mixing the alloy with mercury, as chloroform, rhigolene, and gasoline. In these fluids the ageing by time at ordinary temperatures seemed to go slower than in air, and in the cooler spring months looked as though it might be of value. But when the warmer days came they went as the rest. Progressively the shrinkage became greater until it was demonstrated that the scheme was of no value.

All of the evidence now seemed to point to temperature as the one factor producing these changes in cut alloys. All formulæ tried had been affected in a similar manner, but in varying degrees. To control temperature is not an easy thing; that is, to so control it as to serve the purposes of the dentist in keeping his alloys in condition for use in filling teeth. What control would be required was unknown. Indeed, when I came to analyze my findings I had not yet learned much about the matter. True, chemical agents acting upon the alloy were excluded. The change occurs in the metal itself, and seems to occur more rapidly in high than in low temperatures. But the dream of finding conditions under which alloys could be kept in good condition for filling teeth seemed as far from being realized as when I began the search. The outlook was at this time very discouraging.

I now began preparations for the study of thermal influences on cut alloys in a methodical way. I visited W. S. Lurton's ice plant and obtained the use of a section of the vat containing the cold brine in which the ice is made. Tubes of alloy were hermetically sealed and sunk in this cold brine, and controls of the same cutting were deposited in my drawer for comparison. An ice tank was arranged for keeping cut alloys at the temperature of melting ice, and cut alloys, both in sealed tubes and in corked bottles, were placed in it for future tests. Sealed tubes of alloy were hung in my south window between the glass and a heavy paper curtain where they would receive the full light and heat of the sun. Some of these were protected from the light by wrapping in tin foil. My incubating ovens for the culture of micro-organisms were brought into use for evenly maintaining temperatures between room temperature and that of boiling water. These have proven most valuable in this study, for with them any desired temperature can be maintained for any length of time without variation. These arrangements gave me very complete control of any temperature desired, and for any length of time. But this work required much time and the most constant care, for at first I was ignorant of what to expect from the lower temperatures. Therefore, examinations had to be made at frequent intervals in order to note the progress of the effects of different temperatures. This made the labor constant day after day, rapidly filling my notebook with results. These results must now be given in a wholesale way rather than in detail, for all were going on together and events recorded as they occurred. Afterward the book was indexed, and the continuation of each individual class of experiment posted to itself in other books for the purpose of studying each class in detail.

First, as to the alloys hung in the south window. This was begun early in April, when we had some days that for the season were quite warm. The first effect noted was a marked change in the working property. An alloy containing as much as sixty-five per cent. of silver, when fresh cut, works harshly and sets very quickly; so quickly that one must be very expeditious to make anything more than an ordinary filling before the mass is too hard. This harshness and quickness of setting was notably modified in two days, so that the alloy could be worked with more ease and leisure. Within a week, however, the fillings came to shrink and the margins to show shrinkage gaps on microscopic examination. In three weeks they came to shrink seven to eight points. The tubes, wrapped in tin foil to exclude the light, were placed side by side with those fully exposed to the light. The result was the same in both sets of tubes. The exposure to light seemed of no consequence.

In this experiment we had a variable temperature, high during the middle of the day and remitting to a comparatively low temperature at night. A thermometer was hung with the tubes of alloy. The highest temperature noted was 105° F., but it rarely exceeded 95°. Alloys of other formulæ hung with the silver 65, tin 35, shrunk in different degree, but all were markedly changed. If they were found to shrink fresh-cut they came to shrink more. If they were found to expand fresh-cut they came to expand less, or finally to shrink.

The ovens for maintaining an even temperature were set at 140°, at 130°, and at 120° F. At the temperature of 140° cut alloys came to shrink very quickly, the full limit of shrinkage occurring in from six to twelve hours. At 130° the effect was a little slower, but at this temperature I obtained a little greater shrinkage with the formula silver 65, tin 35, than with any other; instead of nine points, ten, and in one case eleven, was obtained. With 120° the effect was still slower, and seemed to stop at nine points shrinkage, or about the same point as that obtained in boiling water. The full effect seemed to be produced in about three and a half days; at least, no further effect was noticeable after a continuance of seven to ten days longer ; 110° was also found to affect the alloys promptly.

In all of these experiments in ageing in the incubating ovens (low temperature ageing), the most salutary effect on the working property of the alloys was noticeable, the lowest temperatures producing the best results. The ageings at 110° and the ageings in the sun produced the best working property. The difference between these and those aged in boiling water was very pronounced, and in favor of the low-temperature ageing. With any of the plans, however, the working property is greatly improved. The fact that I failed to obtain as much shrinkage with other temperatures as with 130° has caused me to use that temperature in all cases where I have tested alloys for their full limit of shrinkage.

The alloys placed in the cold brine at the ice factory were examined after three weeks. The alloy, hermetically sealed in glass, had laid undisturbed during that time. The temperature record gave 17° F. as the highest, and 13° as the lowest, that had occurred during that time. The first test filling was mixed with mercury within fifteen minutes after the alloy was removed from the brine ; another in one and a half hours, and a third in three hours. The alloy worked as crisp and harsh as the fresh-cut, and seemed to harden just as quickly. Two of the fillings gave one point expansion and one two points. Three weeks' more time gave like results ; that is to say, no change in the alloy became perceptible at a temperature of 17° and lower. Supposing that no change would occur at this temperature if it could not be detected in that time, the experiment was discontinued, a matter that I have regretted since noting the results from keeping alloys on ice.

The alloys kept on ice were examined at frequent intervals. During the first ten days no change seemed to occur, the alloy remaining as crisp seemingly as when fresh cut, and continuing to give the usual expansion. I then cut a supply for use in my practice and placed it on the ice, and afterward was handling it frequently ; besides making occasional test fillings from that first placed on the ice. After about fifteen days a marked change in the working property began to be manifest ; and gradually the alloy came to work much softer and did not set so quickly. As I had used this alloy for nearly a year, cutting it fresh for each filling, besides the experimental uses I was making of it, its peculiarities were very familiar to me, so that I readily noted slight changes. But notwithstanding the change in the working property, it did not shrink. I had so long regarded the change in the working property as a part of the change of condition which induces shrinkage, that it was very difficult for me to regard the one as separate from the other. But they are evidently in some degree separate factors. This softening of the working property continued to increase, and at the end of three months I found that the test fillings did not stand up as sharply as at first. My supply of the material first put up was running low so that I could not make fillings so often, and it was not examined again until the end of five months. At that time I found a shrinkage of two points, the results being the same in two separate tests. The sample of the same cutting sifted together with that placed on the ice, and then divided from it and placed in a corked bottle in my drawer, where it had remained from May to September, was now tested in two separate fillings, both of which gave a shrinkage of eight points.

This is sufficient detail, perhaps, to give the reader a fair idea of the effects of temperature on cut alloys. It must be remembered that in the last test given the alloy had been in my drawer from May until the last of September, and had passed through the heated term of July and August. Alloys that had been two and a half months in a cold room in winter shrunk two points. Alloys that had been in a moderately warmed room from the middle of October to the first week in January, and in a cold room until the middle of March, shrunk five points. Alloys that were kept in a room that was warmed, and very close to the heater so that many times they were very warm, from the first week in January till the latter part of March shrunk eight and nine points. These were all silver 65, tin 35, and tests fresh cut gave an expansion of one or two points. All of my observations tend to confirm these results. Indeed, there has been no other kind of results from time and differences of temperature. The effects of artificial temperatures are not out of harmony with these results. It is little wonder that amalgam has been an uncertain filling-material.

In his work on plastics and plastic fillings, Dr. Flagg states that alloys may be aged by shaking in a bottle I tried this last fall, and a definite change resulted ; and I accepted this as conclusive at the time. In thinking of it I came to regard it as an important matter ; for, if ageing occurs from this motion, there can be no safety in the shipment of alloys. If they should be so placed in a car that shaking will occur, the physical properties will be changed. Now that I had found that ageing occurred from comparatively low temperatures, the question of the effect of the warmth of the hand had to be considered. I tried it in a manner to exclude this, and the ageing failed. I then sealed several tubes in glass, and went to Kellogg Bros. machine shop, selected a shaft that was revolving about seventy times per minute, and secured two of the tubes to its end in such a way that they would be turned end over end with every revolution. When the machinery was put in motion, I could see that the alloy continually fell from end to end of the tubes,—about two and a half inches. A third tube was left in such position as to be exposed to the same thermal influences without being shaken, to serve as a control. The shaking was continued twenty hours. Test fillings were made immediately afterward, and the three tubes gave like results. No ageing had occurred from the shaking.

For a severer test I put up four tubes of alloy, each containing sufficient material for two fillings. Two of these were aged in boiling water. I took them to J. Capps & Sons' woolen mills, and fixed one of the aged tubes and one that was not aged upon the arm of a bit of machinery known to mill men as *Wright's noiseless doffer comb on second breaker*, a portion of a kind of carding machine. As placed, the tubes were given a reciprocal motion of about two and a half inches, and the arm made twenty-four hundred strokes per minute. The other two tubes were so placed as to be exposed to the same thermal influences without being shaken. The shaking was continued twenty hours. Test fillings were made immediately afterward, and it was found that each specimen was in perfect agreement with its control. The aged specimen seemed to have suffered no change, while those fresh cut each made perfect fillings. The ingot fresh cut gave two points expansion. Therefore, there was no change induced by the shaking when we come to exclude the thermal influence. These results were regarded as sufficient to exclude ageing by shaking the alloy.

In this way I have tried one thing after another, until I have excluded everything that has been suggested to my mind as possibly affecting the physical characters of cut alloys, and gradually it has been narrowed down to the one factor, thermal influences. The most of these schemes have simply come to nothing, and must be passed by.

Perhaps it would be well before going on to the next step taken in this work to state briefly the plans of manipulation adopted in making test fillings. The material for each filling is weighed as closely as one-twentieth of a grain, and with the formula, silver 65, tin 35, the proportions are fifty per cent. of alloy to fifty per cent. of mercury. This is partially amalgamated by stirring (not grinding) in a mortar until all of the cuttings are engaged with the mercury. This is to prevent the loss of material that will occur if this part of the mixing is done in the hand. All of the work is done over a sheet of clean white paper, so that loss may be prevented. Now the mix is turned into the hand and kneaded to softness. In every case, no matter what the alloy, this mass must be soft enough to readily take good impressions of the skin markings of the fingers without being sloppy to knead. A mass that is sloppy soft cannot be properly kneaded. When a strange formula is taken up, the proportion of mercury that will do this is to be found by experiment before fillings are made, or if from any cause such a mix is not obtained, the mass is thrown aside and a new one made.

The kneaded mass is now weighed to see if any, or how much, loss has occurred in the mixing, and the record made. It is particularly noted as to whether there is any, or how much, stiffening of the mass during the time of the weighing, as indicating the quickness or slowness of the setting. These records being made in brief, the mass is again turned into the hand and kneaded, in case a little stiffening has occurred, into condition for wringing out the excess of mercury. It is then wrapped in strong muslin, so that a good hand-hold can be had to either end, and twisted with about all of the strength of my hands. The mass usually made for these test fillings weighs one hundred and forty grains when blocks for trial of flow and crushing stress are to be made, or one hundred and twenty to one hundred and thirty grains when only the tube filling is to be made ; and it requires about three times the power to produce the same dryness in a mass of this size as the usual mass made for filling teeth. Now the mass, as wrung out, is again weighed to determine the amount of mercury lost. After this record is made, the packing of the filling is proceeded with, using a very broad serrated point for the main portion of the work, but going around the margins with a smaller instrument, being careful to use only such force as will compress, and not cut into, the material. If in packing the surface of the material becomes soft, or muddy, it is dried out by heavy pressure with a large rubber point that, when strongly pressed upon, just fills the diameter of the cavity. The cavity is filled more than full, and dressed down level, and then a steel disk one-hundredth of an inch thick is pressed into the surface in the center of the filling, as a contact point for the micrometer in taking measurements. Amalgam is again packed on the surface of the filling, and it is again dressed down level and finished as perfectly as possible, so that its margin may be in the best practicable condition for microscopic examination. The filling is not touched afterward. The first measurement is made immediately it is completed, and when it is possible the filling is examined with the micrometer every hour for the first five or six hours, and twice per day afterward until all movement has ceased. It is also examined with the microscope almost as frequently, to see if the visible movement is in agreement with the micrometer record. Whenever there is a failure in this correspondence,—and they occur occasionally,—there is something wrong, some error that is to be found and righted. Thus the two instruments are a continual check on each other.

When the filling is completed and the first measurement is taken, the notes of the case are put into permanent form, and the calculations made which show the percentage of mercury in the mass at every step in its preparation, and the percentage remaining in the filling. All of these figures (the calculations) are preserved, so that they may be reviewed for error at any time. The working property, rapidity or slowness of setting, and other peculiarities of each mass are described. Nothing is left to memory.

In this article I am writing of the differences that occur in cut alloys, and presently of the differences in formulæ, and not of the manipulation of amalgams further than to inform the reader of the processes used. To the end of discovering differences occurring in alloys, and differences in formulæ, each filling is made as nearly like every other filling as practicable, considering the differences in physical characters. Those alloys now to be studied that have a larger proportion of silver dissolve much less readily in mercury, and require to be kneaded much harder and longer, or even to be *ground in the mortar* to obtain the best strength of the amalgam, and the best working property of the mass. They give up their excess of mercury more readily, and should not be wrung with as much force. But otherwise the effort has been to treat all as nearly alike as possible.

I do not know whether the profession realize, or can realize from any words of mine, just what these measurements mean. It seems to me that it is necessary that they be followed with the microscope for a time to gain a full realization of them, and of their importance. To most minds the ten-thousandth of an inch seems a very small thing, and it is so from the standpoint of ordinary measurements. But from the standpoint of microscopic measurements it is rather coarse. Microscopists use the micromillimeter (one-thousandth of a millimeter, using the Greek letter μ to represent it) as their unit of measurement, and divide this into tenths for the measurement of micro-organisms. The micro-organisms that are instrumental in causing caries of the teeth measure from 0.4 to 0.8 μ. Now, one-ten-thousandth inch is substantially 2.5 μ. From this it will be seen that if shrinkage opens the margins of a cavity that has been filled with amalgam one-ten-thousandth of an inch, or even one-half that, there is room for the free entrance of micro-organisms.

The tubes used in this experimental work since May of this year have cavities thirty-eight-hundredths of an inch in diameter, and thirty-hundredths of an inch deep, with a flat bottom A groove is cut in the wall at the bottom, which holds the filling at that point, so that in case of shrinkage the surface of the filling sinks down into the cavity. It is this lineal shrinkage that is measured with the micrometer, and one point shrinkage means a shrinkage of one-three-thousandth of this length, or one in three thousand. This movement, if equal in all parts of the mass, should cause the filling to separate from the walls of the cavity slightly more than one-half of one-ten-thousandth of an inch (the breadth of the cavity being thirty-eight instead of thirty hundredths of an inch). This supposed break I have never been able to demonstrate with a half-inch lens; but when the micrometer marks two points shrinkage, the break of the margin appears as a fine line of parting of the filling from the walls of the cavity. When the shrinkage has increased to ten points, the parting of the filling from the walls of the cavity appears, with a good half-inch lens in the binocular microscope, about broad enough for the thickness of an ordinary blade of a pocket knife to enter. I refer to the back, or thick part of the blade. Then, of course, the margins are wide open, and but for the groove at the bottom the filling would fall out. In expansions the micrometer will generally show three or four points before any movement can be demonstrated with the microscope, but greater expansions cause the amalgam to slip up out of the cavity, breaking the smoothness of the margins.

The reader who has followed me closely will have noticed that with the alloy, silver 65, tin 35, the shrinkage produced by subjecting it to the temperature of boiling water has been nine points quite uniformly. That shrinkage was exceeded only by subjecting the alloy to the temperature of 130° continuously for a number of days, and after that degree of shrinkage was produced a longer continuance of that temperature seemed to produce no further effect. Substantially the same result has been produced with each alloy that has been subjected to trial, only that there has been a difference in the amount of shrinkage produced. In other words, each alloy is found to have a fairly definite *shrinkage expansion range*.* In some this range is all shrinkage, in others it is all expansion, and in still others it is both expansion and shrinkage. Unmodified silver-tin alloys (those that contain no other metal) that have seventy-five per cent. of silver or more expand only. They cannot be made to shrink by ageing, though their expansion can be greatly modified. The unmodified alloys containing as much as sixty-five per cent. of silver, and less than seventy-five per cent., expand when fresh cut and shrink when fully aged. Those alloys containing as much as fifty per cent. of silver, and up to sixty-one or two per cent., shrink only, but shrink much more when aged than when used fresh-cut. Those that contain less than fifty per cent. of silver, first shrink and then expand. When used fresh-cut the expansion is the greater; when aged the shrinkage is the greater. Alloys containing from sixty-five to seventy-five per cent. of silver are hard, and make hard and quick-setting amalgams; they make also the strongest amalgams that can be made of silver and tin. Alloys containing less than sixty per cent. of silver are soft, and make soft, slow-setting amalgams. These grade into the group above somewhat gradually. Alloys containing more than seventy-five per cent. of silver are soft, and make frail, slow-setting amalgams. The slow setting occurs somewhat suddenly after passing seventy-five per cent.

---

* See exhibit, page 982.

While these subdivisions of the silver-tin alloys grade into each other more or less gradually, they are sufficiently distinct to be of much value in the study of the possibilities of the silver-tin amalgams. That group between sixty-five and seventy-five per cent. of silver must be our dependence in the consideration of the unmodified alloys for filling teeth. All of them are readily brought to the point of neither shrinkage or expansion by what I shall call fractional ageing, or fractional annealing and tempering. Hereafter I shall use the term annealing when artificial ageing is meant. For instance, the alloy, silver 70, tin 30, expands fourteen points when used fresh-cut, and shrinks seven points when fully annealed. It only requires a few experiments with annealing this alloy in the incubating ovens to be able to stop off the annealing when the zero line is reached; and this is true of any alloy of this group. The next question is, will it remain at this point? Experiment has shown that this formula will not; it will come to shrink more by *time* at common temperatures. Will any alloy do so?

I have been tripped so many times in the effort to explain instrumental results in this study, that I resort to it with hesitation; but a thinkable explanation is often better than no explanation, and furnishes a basis for progressive thought by which we may arrive at other conceptions.

The explanation which I suggest is briefly this: In the cutting of an alloy the violence used hardens it, producing an allotropic condition of the metal, in which its chemical relations to mercury are profoundly changed. High temperatures, or even ordinary temperatures acting for a considerable time, have the effect of annealing the cut alloy and restoring its normal condition.

If this explanation holds good, an alloy that has been fully aged or annealed, that is, brought to its normal condition, should remain in that condition indefinitely at normal temperatures. I began experimentation on this theory in the latter part of April last. The first experiment was to harden a portion of an ingot as much as possible by hammering, and to compare the results from cuttings from this with cuttings from the contiguous portion of the ingot not hammered. It could not be hammered very much because of its brittleness, but it was in some degree flattened and drawn. The tests showed an increase in expansion of four points. The next thing to do was to find an alloy that would neither shrink nor expand when fully annealed, also to learn what constitutes full annealing, and then to test these annealed specimens by time; indeed, to test the theory in all its bearings. To this end I had a number of formulæ cast and began the work of annealing them to the zero line, trying at first to do this by the boiling water method and later abandoning the boiling water in favor of the ovens. I may dismiss the greater part of this laborious work with a sentence. Experiment showed that the range of formulæ of the unmodified silver-tin alloys would have to be limited to that lying between 70 of silver to 30 of tin, and 75 of silver to 25 of tin. The former annealed to zero would come to shrink more in summer temperature. The latter could not be held down to the zero line.

As the experiments with silver 75, tin 25, seem to illustrate a principle, I should speak of them in some detail. When the alloy is used fresh-cut it gives about sixty points expansion; varying considerably in different fillings, as is always the case with great movements, whether up or down. In the upward movement the filling rises squarely up above the margins of the cavity without spheroiding, if the cavity-walls are parallel and very smooth. If the cavity-walls are rough or uneven, it will spheroid (round up in the center) or take various shapes, as it is held down more or less by various portions of the cavity-walls, and the measurement will vary accordingly. When the condition of the alloy is such that the movement is very slight, the results are very constant. I first annealed this alloy (silver 75, tin 25) ten minutes in boiling water.* This was insufficient; and fifteen was tried, by which the expansion was reduced to six points. Increasing the time to thirty minutes, and finally to one hour, produced no further change. I then placed fresh cuttings in glycerol heated to 300° F., for half an hour. This reduced the expansion to one and one and a half points in the several fillings made. I then distributed the alloy thus annealed in different positions to test its staying qualities. It was put in corked bottles, and some was placed in my drawer and some in the south window in the sun. In the course of a month all of these specimens came to expand five and six points. This seemed to demonstrate that an alloy could be over-annealed so that in normal temperatures it would gravitate back to a condition of expansion. Here a danger was pointed out to be avoided in the annealing and tempering of alloys.

An alloy of silver 72.5, tin 27.5 was next tried. The limit of its expansion fresh-cut was about forty points. By annealing fifteen minutes in boiling water, or for twenty-four hours at 130° F., it was caused to shrink two points. The annealing of this was stopped off at one point above zero (one point expansion), and a number of bottles distributed to test its staying qualities; and after a time more samples were treated in a similar manner until quite a collection was obtained.

The plan gradually developed for doing this annealing was what I came to call in my notes the fractional plan, or fractional annealing. First, the alloy was tested as to its full annealing point by fifteen minutes in boiling water. If it came to, or slightly below, the zero line, not more than three points below, I tried the fractional annealing. The alloy was placed in the oven at 120° F. and allowed to remain six hours. Now the whole of the alloy was removed to room temperature and a test filling made, and the result determined, which usually requires twenty-four hours. The alloy is found to expand six points. (I am reciting actual experiment.) It is now returned to the oven for another six hours; for it has been learned that the last part of the reduction is much slower than the first. Then the whole of the alloy is again removed to room temperature and another test made. In this test it is still found to expand two points. It is again returned to the oven for three hours, and the third test is made. Two fillings measured with great care give respectively one-half point and one point expansion; and it is decided to distribute the alloy for a test of its staying qualities.

---

* All of these annealings are done by placing the cut alloy in a small flask blown on the end of a glass tube a foot or more long, and immersing the flask in boiling water.

Latterly I have done this annealing in this way. After the primary examination of the alloy by fifteen minutes in boiling water to determine the point to which it will anneal, and finding this satisfactory, a sample sufficient for three or four test fillings is put into the oven. One test is made in six hours, one in nine hours, one in twelve hours, and perhaps the fourth in fifteen or eighteen hours, depending on the progress shown by the first test. From the results in these tests the time for the annealing of the alloy is determined; and it is placed in the oven for that time. One hundred ounces can be annealed together as well as a single ounce, provided it is divided into suitable packages. If the alloy has come down to three points below zero by the boiling water test, it will require much less time in the oven than when this test has reduced it only one point below.

Preparations from five ingots of alloy representing five different melts, annealed to zero in the ways mentioned, or within one point of zero, have passed through the heated term of this summer without material change. The oldest one of these was prepared and distributed for the test of its staying qualities on the 27th of April. One sample was placed in my drawer, one was put in a cool place at first and later on ice, and a third was hung in my south window, between the glass and a heavy paper curtain, where it was exposed to the full rays of the sun; and it stayed there until the last test filling was made, on the 5th of October, having passed through the heat of the summer in that position. In this way I have tried to imitate the utmost heat of summer and the winter's cold. The greatest variation in the test fillings made from this alloy has been two points. Six fillings made within a few days after the tempering gave expansion 1–, ½, 0, 1, 0, 0, respectively. I regard these variations as being within the limits of error. Of the test fillings made at intervals during the summer, one from the bottle in my drawer gave two points expansion, and one from the bottle in the window, the last one, gave zero. The alloy kept on ice was removed to room temperature September 5, and a filling made from it October 21 gave zero. All the rest of the fillings gave either one expansion, or a fraction that failed to reach either one above or one below that figure.

The other successful temperings were put up May 5, May 21, June 5, and June 15, so that all were in time for the heated term of July and August, which is the severest test of the seasons. Of these none have varied as much as two points, and have therefore been a little closer than the first. They were all kept in the drawer. These successful temperings seem to me to establish a very important principle, and demonstrate that we can have alloys that will retain their physical characters for a sufficient time, if not permanently. The time, only a little over five months, may not be sufficient for a full test: years will be required; but the time being that of the severest test possible,—the hottest months of the year,—adds greatly to its value.

While these five tests were successful, there were other efforts that were not successful. As soon as these experiments began to demonstrate their probable success, I began to look into the matter as well as I could from the standpoint of the manufacturer, and have had that in mind in most of this experimental work. A number of the ingots made for me, and some of those I made myself, have not stood up to the test; and, so far as I am now able to see, the greatest difficulty will be to cast the ingots with sufficient uniformity to satisfy the demands of these rigorous tests. It is not always that the formula weighed into the crucible is represented in the ingot. Perhaps it never is perfect, and certainly more of the tin is lost in some cases than in others. Some of the ingots fell down to four and five points below zero, and when the annealing was stopped off at zero they came to shrink later, and were failures. Again, some ingots supposed to be of this formula could not be brought down to zero by annealing fifteen minutes in boiling water, and failed for that reason. On the other hand, I have succeeded with ingots of silver 73 tin 27, and with silver 73.5 tin 26.5. I have found that as I have adopted more perfect means of preventing the oxidation of tin in melting and casting, I have had to put a larger proportion of silver in the crucible. Alloys within and near this range are exceedingly sensitive, so sensitive that every fraction of a part lost or gained counts in the results.

No directions could be given, no matter how much in detail, that would enable one to make these tempered alloys successfully without the full equipment of instruments and the acquired skill in their use. But this should not be any great difficulty. As to the casting, my own experience is limited; and no one as yet has tried casting for these rigid tests with a full realization of what he has before him. When the matter is understood, and the proper effort is made, I do not doubt that this work can be done with the regularity and dispatch that will satisfy the conditions of commercial production.

When I began to realize that there were variations in ingots of the same formula that influenced my results, I supposed that the specific gravity would serve as an index to the loss of tin in melting and casting. The literature pertaining to the subject of alloys was generally silent on that phase of the subject; but experimenters with bronzes and other alloys of copper used in the manufacture of ordnance seem to have relied upon the specific gravity as an index to the solidity of their castings. In the use of this test they usually found their alloy lighter than the mean of the metals composing it, and this difference was attributed to air-spaces in the castings. I supposed that I could use the specific gravity in a somewhat similar way to determine the true formula of the ingot, especially as I had observed that casts of alloys of silver and tin were generally very perfect. I found the ingot *heavier* than the mean of the metals composing it; or, at least, heavier than the mean of the metals weighed into the crucible. This result would occur from the loss of tin by oxidation. I took the specific gravity of most of the ingots I used in my work. The ingots of silver 65 tin 35 gave an average specific gravity of about 9.5, while the mean specific gravity of the metals that went into the crucible was but 9.11. The variation found in the ingots when the whole ingot was weighed ran from 9.48 to 9.53. Now, the mean specific gravity of silver 76 tin 24 is 9.51, and my specific gravity tests indicated that the true formula of the ingots of the supposed silver 65 tin 35 was very near that figure, but with a variation of about five per cent. in their composition. This increase in the specific gravity was much more in the alloys containing a high percentage than in those containing a low percentage of silver.

When I came to casting myself, and keeping close records of the loss of weight in my melts, I found that the loss of weight was not in agreement with the change in the specific gravity, and that this test indicated a marked condensation of the metals in the formation of the alloy. These tests are not altogether satisfactory, and yet they indicate condensation very certainly. The series of formulæ made included formulæ of silver 40, tin 60 ; silver 75, tin 25 ; and the intermediate formulæ by steps of five per cent., and by steps of one per cent. between seventy-two and seventy-five per cent. of silver. These casts showed a nearly regular increase in condensation from below upward to sixty-five per cent. of silver, the apparent condensation remaining about the same above that point. These formulæ were repeated, an interval of about six weeks intervening. The differences varied from naught to four-hundredths of a volume. A table of these might be tedious, but I will give two that seemed to me to be the most reliable tests of condensation, though the loss of metal in these was not the least.

The melts were of eight hundred grains. The proportions, silver 40, tin 60 parts, were weighed into the crucible. The ingot weighed 795.65 grains, a loss of 4.35 grains. Supposing this loss to be entirely of the tin, the formula of the ingot should be, silver 40.22, and tin 59.78. The mean specific gravity would be 8.318. The actual specific gravity was 8.509. This indicates a condensation of 2 34 per cent. in the formation of the alloy.

The proportions silver 73, tin 27 parts, were weighed into the crucible. The ingot weighed 796.35 grains, a loss of 3.65 grains ; supposing this loss to be entirely of the tin, the formula of the ingot would be, silver 73.33, tin 26.66, and the specific gravity should be 9.416. The actual specific gravity of the ingot was 9.814. This indicates a condensation of 4.02 per cent. in the formation of the alloy.

Either of these taken alone might have seemed reliable. I do not know of any failure of exactness in either of them. But at the time I cast the one last given I cast a companion ingot of the same formula that seemed to be just as perfect so far as I could determine at the time of casting. The ingot weighed but 774 grains, indicating by the same rule a loss of twenty-six grains of tin. The specific gravity was 9.809, or five-thousandths of a volume less than that of the ingot in which the apparent loss of tin was less. Yet by the most liberal calculation there was still a considerable condensation in the formation of the alloy. I cannot account for the difference in the loss in the last ingot, except on the supposition that, without being noticed, a globule was thrown out of the crucible in stirring the molten metal. But this is only supposition. This is the worst of my losses of metal in casting, but others scatter along, and serve to throw doubts over the accuracy of the observations. Still, every ingot of the two series indicated a considerable condensation. It is only the exact amount of the condensation that seems to be in doubt. It is also probable that the perfection of the mixing of the metals will influence the condensation in some degree, especially as it has been found that *mixtures* of silver and tin do not give the same results as *alloys* of silver and tin. Also, some part of the differences between ingots of the same formula may be due to air-spaces in the casting. This question can probably be studied more accurately by analysis than by synthesis.

In the casting that I have done I have been continually passing from one formula to another. It is probable that closer work can be done in the continual repetition of the same formulæ, or in casting formulæ of very nearly the same composition. It is also probable that greater accuracy can be had with melts of larger amounts of metal.

While the specific gravity is not a safe guide to changes of formulæ from the loss of tin in melting and casting, it does seem to be a fairly safe guide to what the ingot will do in test fillings. Of the same formula, the ingots with the higher specific gravity will show less shrinkage when annealed.

The principal object and aim of this series of ingots was to obtain a general view of the qualities of the silver-tin amalgams within the range specified, and I think it well to give a tabular exhibit of the results of test fillings made from them. They were all cast from the same lot of metals, so that if influenced in any degree by impurities, that influence would be the same in all. However, the metals were as pure as could be obtained ; and as to differences in specific gravity of the ingots, they were certainly as good as those that have been cast for me by manufacturers of alloys.

Test fillings were made from each of these formulæ ; from the fresh-cut alloy ; from that which had been subjected to the temperature of boiling water for fifteen minutes ; from that subjected to a temperature of 130° for two days, and for seven days. The results from these different annealings are practically the same, so that with this statement it is only necessary to tabulate the results given by the alloys fresh-cut, and the alloys annealed. This tabulation shows the expansion shrinkage range of each alloy, from silver 40, tin 60, to silver 75, tin 25, and it is practicable to make out from it the qualities of any possible formula within this range. It covers the range of formulæ recently used in filling teeth, and includes all that can be brought into condition for use.

I will now endeavor to give a brief description of the physical properties of amalgams from these alloys—a kind of bird's-eye view of them. The exhibit shows the formulæ, the condition of the cuttings, as fresh and annealed ; the percentage of mercury in each filling, the shrinkage or expansion, the flow, and the stress required to crush. The trials of flow and the trials of strength by crushing were with blocks 85x85x85 thousandths of an inch. All of the blocks were made in the same cavity, and were made by an assistant while I was making the tube-filling for the trial of shrinkage and expansion, and from a portion of the same mass. Six blocks were used in each trial, and the figures represent the average result, the trial being made when the blocks were five days old. The trial of flow was with sixty pounds for one hour, and the figures show the average per cent. of shortening in that time. In crushing, the stress was increased continuously until the blocks crushed, and the figures represent the stress at the moment of crushing.*

EXHIBIT OF UNMODIFIED SILVER-TIN ALLOYS.

FORMULÆ.		How Prepared.	Per Cent. of Mercury.	Shrinkage.	Expansion.	Flow.	Crushing Stress.
Silver.	Tin.						
40	60	Fresh-Cut.	45.78	6	7	40.15	178
40	60	Annealed.	34.14	9	3	44 60	186
45	55	Fresh-Cut.	49.52	4	8	25.46	188
45	55	Annealed.	32.13	11	1	28.57	222
50	50	Fresh-Cut	51.18	2	2	22 16	232
50	50	Annealed.	37.58	17	1	21.03	245
55	45	Fresh-Cut.	51.62	2	2	19.66	245
55	45	Annealed.	40.11	18	0	17.53	276
60	40	Fresh-Cut.	52.00	1	0	9.06	239
60	40	Annealed.	39.80	17	0	14.10	297
65	35	Fresh-Cut.	52.00	0	1	3.67	290
65	35	Annealed.	33.00	10	0	5.00	335
70	30	Fresh-Cut.	55.00	0	14	3.45	316
70	30	Annealed.	40.00	7	0	4.67	375
72.5	27.5	Fresh-Cut.	55.00	0	42	3.92	275
72.5	27.5	Annealed.	45.00	3	0	3.76	362
75	25	Fresh-Cut.	55 00	0	60	5.64	258
75	25	Annealed.	50.00	0	6	5.40	300

In the study of this exhibit the differences that occur in *the amount of mercury* in the fillings from the fresh-cut alloy, and from the annealed, should be particularly noted. It will be seen that it is always less in the fillings made from annealed alloy. This represents in some degree the differences in the solubility of the fresh-cut alloy and the annealed, but not fully, for in making fillings from the fresh-cut alloy the mass is always drier than the mass made from the annealed alloy, notwithstanding the greater proportion of mercury.

In studying *the shrinkage and expansion*, it will be noted that both shrinkage and expansion are marked for the alloys containing from forty to fifty-five per cent. of silver. In these the shrinkage occurs as the first movement, and the expansion follows later. For instance, in the alloy containing forty per cent. of silver, when used fresh-cut, a shrinkage of six points occurs within the first twenty-four hours; then it will remain about stationary for from twelve to twenty-four hours more, the margins standing wide open when viewed with a half-inch lens. Then an expansion begins which continues very slowly for three or four days. This expansion is usually a little greater than the shrinkage in alloys containing but forty per cent. of silver; and it generally doubles the shrinkage in alloys containing forty-five per cent of silver. This dual movement then diminishes with the increase of the silver, and is seldom seen after passing sixty per cent. After this upward movement there is usually a slight shrinkage, which I have not marked in the table. Annealing the cut alloy, or ageing by time, causes the shrinkage to be greater and reduces the expansion following it. This peculiar movement was well shown in the exhibit published last summer.* The effect of annealing is much less on the alloy containing but forty per cent. of silver than on any other formula given, and increases as the proportion of silver is increased, until seventy-five per cent. is past, when it again diminishes. The greatest shrinkage occurs with the proportion of fifty-five per cent. of silver to forty-five of tin, a shrinkage of eighteen points. In the measurement of so great a shrinkage there is considerable variation in different fillings ; but as much as eighteen points is often obtained. If the walls of the tube are parallel and smooth, the fillings will all fall out of the cavity.

---

* The flow of amalgams was fully described in the COSMOS for July, 1895.

When my tubes were first made I left a narrow band at the bottom unpolished, with the idea that if the filling should shrink this part would hold and cause the surface to sink down. I had but few fillings get loose in the tubes, and the matter rather went out of my mind. After a considerable use of the tubes the margins of the cavities became marred, and, as I was going to have a number of gentlemen make test fillings at the meeting of the Illinois State Dental Society (this was last May), I had the tubes reground and polished. They came back to me with the *walls polished to the bottom.* They were nicely done, and I thought but little about the change. I took the tubes to the meeting, and thirty-four fillings were made by as many different persons. The next day I was greatly chagrined at finding about half of the fillings loose in the tubes, so that I could not follow the shrinkages by measurements with the micrometer, while a considerable number fell out. In those tubes in which the fillings were loose, but did not fall out, the shrinkage could still be followed with the microscope ; but this is not so satisfactory as the micrometer. I will say in passing that the results of the fillings made at this meeting by thirty-four persons, each using any amalgam he chose, and manipulating in his own way, were not essentially different from the results which I published last summer.

After I returned home, and began experimental work with the tubes, I found they were not reliable for the measurement with the micrometer of shrinkages of more than four or five points. The fillings would get loose and fall out. In order to remedy this difficulty I cut the bottoms of the tubes flat, and with a split bur, that was arranged to spread after it was passed to the bottom of the cavity, a narrow groove was cut in the wall about two-hundredths of an inch in depth. Since that was done, I have had no further trouble with fillings falling out of the tubes. This enlargement has caused a slight increase in the number of points a given expansion will measure, about one in ten. This little difficulty is in itself a sufficient answer to those who have supposed that the shrinkages I have seen are merely superficial.

These great shrinkages, such as we get with the formulæ containing from fifty to sixty per cent. of silver, can be much modified by the proportion of mercury in the mix, and the time at which the mass is packed in relation to the time of mixing. These shrinkages occur quickly, often one-half occurring within the first two hours after the filling is made. If the packing of the mass is delayed as much as possible, and the filling made *dead hard*, the shrinkage will be less. If so little mercury is mixed with the mass that it will only make a dark powder that can be made to cohere by strong pressure, the shrinkage will not be quite so great. Still again, if so much mercury is mixed with the alloy as to make a very sloppy mass, and this is put in without removing any of it, the shrinkage will be considerably reduced. None of these prevent shrinkage ; they only modify the amount. The two latter methods make very frail amalgams, and none of them are suitable for use in filling teeth. With an alloy in condition to neither shrink nor expand, these influences seem to be inoperative, all of them, so far as I have been able to see thus far, a fact for which we may be very thankful. It seems, from experiments this summer, that if the alloy is in condition to form a compound that neither shrinks nor expands in setting, no manipulation to which I have been able to subject it will cause it to vary from it. I am therefore able to make filling after filling that will measure alike (or within what I regard as the range of error in measurement, about one point), and show no break of the margins on microscopic examination. At the same time, the flow and crushing stress may be greatly modified by changes in the amount of mercury and the mode of manipulation.

---

*COSMOS for August, 1895.

In connection with this group of alloys there is one thing that troubles me and leads me to suspect that there is some influence acting to modify the shrinkage and expansion of alloys not yet discovered. Among the cut alloys that have come to me there are several samples that give a shrinkage of from twenty to twenty-four points. This also appeared in the fillings made at the Illinois State Dental Society last May, as well as I could make out by microscopic reading. The greatest shrinkage that I have been able to obtain from alloys cut by myself has been eighteen points.

It will be seen from the exhibit that the alloys containing from fifty to sixty per cent. of silver, used fresh-cut, do not shrink much, and when used in this condition they make fair fillings. When I say *fresh-cut, I mean that the alloy is used within one hour after cutting*, not a week or a month. We cannot tell what we may have the next day or the next week, unless we know very accurately the thermal conditions to which it has been exposed. In any event we will not have the same thing as the fresh-cut alloy.

When we pass on to sixty-five parts of silver we begin to have expansions of the fresh-cut alloy, and at the same time pass into the group of hard alloys. From this on to the proportion of seventy-five parts of silver the increase in expansion is very rapid, and the alloys are correspondingly sensitive to slight changes in the exact formula. By the steps of five, and two and a half per cent. exhibited, we get one point expansion at sixty-five per cent. of silver, and successively fourteen at seventy, forty-two at seventy-two and a half, and sixty points at seventy-five per cent. of silver. The shrinkage when annealed is reduced less rapidly, and, therefore, the expansion shrinkage range is continually increased. Beginning with the annealed alloy with sixty-five parts of silver we have, according to the new tubes, ten points shrinkage, and successively seven with seventy per cent., three with seventy-two and a half, and then pass to six points expansion in the annealed alloy with seventy-five per cent. of silver. As the formulæ for ingots for the production of tempered alloys by the process of fractional annealing must give a shrinkage of not more than three points, and possibly only two should be admitted, and must not expand when fully annealed, the reader may realize how close is the margin, and how accurate the work must be if their manufacture is really successful. We may have other alloys, as we shall see later, but the exactness required will be none the less.

I will now consider the *flow* and the *strength* of amalgams under stress. I had the blocks for these trials made by my assistant, in order to have them from the same mass and in the same condition as that from which the tests for expansion and shrinkage were made; and in order to do this it was necessary that both operations should be done at the same time. By comparison I find the fillings made by my assistant do not average quite as strong as those I have made myself; but the difference is not much, and I give them as they occurred. They are as good as any of us can do regularly in the mouth.

Beginning with silver 40, tin 60 parts, the flow is forty per cent. for the fresh-cut and nearly forty-five per cent. for the annealed alloy. Taking the individual blocks, the variations were from 33 per cent. to 54. It will be noted that the flow of the annealed alloy is the greater, and also that the crushing stress is the greater. The annealed alloy makes the softer and tougher amalgam. This is the general rule throughout the series, though the difference fades almost entirely away with the larger proportions of silver. Inversions of this rule frequently occur in experimental work in which the blocks from the annealed alloy give the lesser flow. As the resistance to flow is sharply influenced by the proportion of mercury, either too much or too little weakening it, also by the degree of perfection of the manipulation, this could hardly be otherwise. An amalgam that will give forty per cent. flow in one hour under a stress of sixty pounds is not suitable for filling teeth in any position in which the stress of mastication comes upon it. No matter how well it may be seated in the cavity, and even if it did not shrink or expand, it could only be a question of time, and not a long time either, when it would be moved by the stress of mastication, and begin to leak; unless, indeed, the power of mastication is much below par. In resistance to crushing this alloy is also the weakest of the series.

It will be noted that the resistance to flow increases with the increase of silver, and that there is a notable increase in this resistance at sixty-five per cent.; or, when we enter the group of hard alloys. Through this group there is not much variation until seventy-five per cent. of silver is reached, when the resistance to both flow and crushing begins to decline, and, I may say, continues slowly to pure silver.

It is somewhat notable that the strongest amalgams may be made from alloys that are but partially annealed. This was first noticed and pointed out to me by Dr. Wedelstaedt, of St. Paul. I have had series of blocks from silver 65, tin 35, the cuttings having been at room temperature for two or three weeks, that gave but one and a half per cent. flow, and resisted crushing up to 400 pounds. Some other formulæ tried have exhibited similar phenomena.

The working properties of this series of alloys differ greatly. In general terms we may say that the group of hard alloys make quick-setting amalgams, and that the soft alloys make slow-setting amalgams. But these grade into each other very gradually as to this property. The quickest setting is found at about seventy-two and a half of silver. With seventy-five per cent. it is slower, and then the slowness is increased so rapidly that with eighty per cent. of silver the setting is exceedingly slow. With any of the group of hard alloys used fresh-cut the hardening is so rapid that the operator must have everything in readiness, and operate quickly, to make a large filling before the mass is too hard for manipulation. With experience in their use, however, a number of operators have become rather fond of using alloys fresh-cut. Their filling is hard at once, and they have the assurance that it will stay as it is left, and the only need is to polish it at a future sitting. In my papers last summer I objected to grinding and mixing alloys in the mortar, or so much kneading as many seemed to practice, because the resulting amalgam was made softer. This was correct for all of the softer alloys, but it has been found that for the harder alloys more kneading is required to bring out their best qualities. This is especially the case with those in the neighborhood of seventy-two and a half per cent. of silver when annealed to zero.* These hard alloys dissolve very slowly in mercury, are tardy in amalgamating, and much kneading is required to make a fully plastic mass. The kneading will be aided very much by beginning the amalgamation by grinding in a mortar until all of the cuttings are engaged with the mercury. Then, if the mass is turned into the palm of the hand and kneaded vigorously until it is so plastic that it will readily take good impressions of the skin markings of the fingers, without being in any degree sloppy, it will be in good condition when the excess of mercury is wrung out with reasonable pressure. Or it may be used without wringing, only that the amalgam will not be quite so strong. If it becomes sloppy soft it has too much mercury, and cannot be properly kneaded. Either a new mass must be made, or a part of the mercury wrung out and the kneading proceeded with. These alloys do not admit of so great a variation of the amount of mercury as the softer alloys. When properly prepared the mass will work reasonably soft, will be sufficiently pasty, and will give plenty of time to make any ordinary filling. It will not, however, admit of much delay.

One of the beauties of the working property of these alloys is, that when the mass is packed it is immediately hard enough so that subsequent manipulation will not spring it away from a wall or margin against which it is packed. It stays where it is packed. It is, therefore, possible to make very perfect adaptations to margins ; a thing almost impossible with the softer alloys. These soft-working amalgams will spring away from the margins at every touch of an instrument. Any one who will make fillings for microscopic examination of the margins for awhile will come to a full realization of this fact. The working properties of the softer alloys are too well known to need further description.

The Modified Silver-Tin Alloys.

Thus far only the simple or unmodified silver-tin alloys have been considered. Alloys to which other metals have been added with the view of modifying their chemical or physical properties, I shall call *modified* silver-tin alloys. I do not know of any studies of these being made under conditions and with such instruments as would reflect clearly the modifications produced in physical qualities. In my own studies I have regarded it as necessary to first acquire a fair idea of the physical qualities of the unmodified alloys as a basis for the study of the modified alloys.

---

* I use the term "annealed to zero" when the annealing is stopped at such a point that the amalgam will neither shrink nor expand.

EXHIBIT OF MODIFIED SILVER-TIN ALLOYS.

FORMULÆ.								
MODIFYING METAL.	SILVER.	TIN.	HOW PREPARED.	PER CENT. OF MERCURY.	SHRINKAGE.	EXPANSION.	FLOW.	CRUSHING STRESS.
	65	35	Fresh-Cut.	52.33	0	1	3.67	290
	65	35	Annealed.	33.00	10	0	5.00	335
	66.75	33 25	Fresh-Cut.	51.52	0	4	3.35	329
	66.75	33.25	Annealed.	33.53	7	0	5.06	380
Gold 5.	61.75	33.25	Fresh-Cut.	47.56	0	1	4.62	330
Gold 5.	61.75	33.25	Annealed.	30.35	7	0	6 07	395
Platinum 5.	61.75	33.25	Fresh-Cut	51.87	0	9	9.68	273
Platinum 5.	61.75	33.25	Annealed.	37.33	7	0	8 20	352
Copper 5.	61.75	33.25	Fresh-Cut.	53.65	0	23	2.38	343
Copper 5.	61.75	33.25	Annealed.	35.60	5	0	3 50	416
Zinc 5.	61.75	33.25	Fresh-Cut.	56.65	0	68	1.83	290
Zinc 5.	61.75	33.25	Annealed.	40.65	0	9	2 07	345
Bismuth 5.	61.75	33.25	Fresh-Cut.	46.26	0	0	4 78	288
Bismuth 5.	61.75	33.25	Annealed.	23.67	6	0	5.58	308
Cadmium 5.	61.75	33.25	Fresh-Cut.	57 57	0	100	6.40	225
Cadmium 5.	61.75	33.25	Annealed.	47.25	0	5	3 54	290
Lead 5.	61.75	33.25	Fresh-Cut.	44 17	0	1	4 88	290
Lead 5	61.75	33.25	Annealed	32.76	10	0	7.18	276
Aluminum 5.	61.75	33 25	Fresh-Cut.	65.00	0	445	——	——
Aluminum 1.	64.5	34.5	Fresh-Cut.	46 98	0	166	12.60	198
Aluminum 1.	64 5	34.5	Annealed.	38 26	0	48	17 90	213

For some years it has been the habit of many manufacturers of alloys to add other metals, with the view, I think, of improvement in the chemical qualities of the amalgam ; though some seem to have had in view the improvement of the physical qualities as well. The study I now give is to be regarded as primary, the question being, what modifications are produced by moderate additions of other metals? and is intended to serve as a basis for finding formulæ for modified alloys of suitable physical qualities for filling teeth, not for pointing out the specific compounds. To this end I have selected the formula, silver 65, tin 35, as the basis with which a primary trial of the metals usually used for the modifications should be made. To this formula I have added gold, platinum, copper, zinc, bismuth, cadmium, lead, and aluminum separately, in the proportion of five per cent. in each instance. I have cast the ingots in two series, a month intervening between the times of casting. Each series was cast from one lot of silver and tin, so as to avoid any deception by possible differences in the purity of these metals. The results from the two series were so nearly the same that it would be useless to give both in the exhibit which I offer. The exact formula weighed into the crucible is, 61.75 parts of silver, 33.25 parts of tin, and 5 parts of the modifying metal. I have placed at the head of the exhibit for the purpose of convenient comparison the results from silver 65, tin 35. I have, also, for the purpose of further comparison, placed an alloy of silver 66.75, tin 33.25 under the first. This latter alloy has just the same proportion of tin as the modified alloys, and the proportion of silver is equal to both the silver and the modifying metal in the modified alloys. The results from each of the modified alloys may be at once compared with each of these, and the modification produced determined.

Each alloy was tested fresh-cut, annealed in a boiling water bath for fifteen minutes, at 130° F., for two days and for seven days. As the results from the several annealings were practically the same, the results are given for the alloys *fresh-cut* and *annealed*. The specific gravity of these showed the same condensation in the formation of the alloys as has been noticed in case of the unmodified alloys, except in case of the alloy containing five per cent. of aluminum. This ingot gave the exact mean specific gravity of the metals weighed into the crucible to the second decimal point. It was a beautiful ingot, remarkably white, and very perfect.

Gold.—The addition of gold in the proportion of five per cent. seems to give a little softer working property, and slows the setting of the mass. The mass has something more of the pasty character, and the fillings made of the annealed alloy are apt to finish very soft, the surface being so springy that it is difficult to make a good finish. It takes a little less mercury than the unmodified alloy, and the flow is a little more. The amalgam is very tough, and bears a heavy stress before crushing. The shrinkage expansion range is reduced three points.

Platinum.—The appearance of the mass made of this alloy is very remarkable. That from the fresh-cut alloy is fairly white, but that from the annealed alloy is very dark, and, in kneading, blackens the hand to an extraordinary degree with a grayish blue black that is rather difficult to remove. The mass looks dirty, and the finished filling is dark. The mass has a very peculiar softness to the feel under the instrument. The setting is slowed considerably. It flows badly. The shrinkage expansion range is increased, and lies a little higher in the scale.

Copper.—This alloy, fresh-cut, sets very quickly. The mass makes up soft, but it becomes hard almost immediately it is left to itself. I had some difficulty in getting good fillings of the fresh-cut alloy on account of this extreme quickness of setting. The annealed alloy makes a very soft, pleasant-working mass, and the setting is as slow as in the unmodified alloy. Expansion and the expansion shrinkage range is markedly increased, the flow is diminished, and the crushing stress is the greatest of the series.

Zinc.—This alloy is very remarkable for the amount and *slowness* of its expansion. Its expansion was so slow that I evidently overlooked the fact that it was still expanding in the first series of fillings made from the first ingot. But a second series from the first and all of the fillings from the second ingot were followed to the time of writing, and I feel certain now that the expansion has ceased. In the fresh-cut alloy the expansion continued forty days. The expansion of the unmodified silver 75, tin 25 alloy, which is nearly the same in amount, is completed in about eight days. The expansion in the fillings from the annealed alloy, which gave but nine points, was not completed until thirty days had elapsed. It will be seen by the table that the expansion shrinkage range is increased to fifty-nine points, and is placed much higher in the scale. The mass from this alloy is also remarkable for its adhesion to the walls of the cavity. Amalgam from an unmodified alloy, in its expansion, will slip squarely up in the tube if not held down by roughness of the walls, but that from this zinc modification does not slip up at all, no matter how perfect the walls of the tube, but rounds up in the center, the margins being held down, apparently, by adhesion. Still, when I came to empty the tubes, there were no signs of this adhesion. They came out clean and perfect.

The fresh-cut alloy is caused to set much quicker, so that I had much difficulty in getting good fillings. With the annealed alloy this was much improved, but it still set very quickly. Otherwise, the mass from the annealed alloy worked very well. The flow is decidedly decreased, and is the least of any of the series of alloys, while the resistance to crushing is good. In the handling it gives strongly the impression of brittleness. This alloy requires more mercury than the unmodified alloys.

Bismuth.—This alloy is remarkable for the readiness with which it amalgamates with mercury, and the small amount of mercury it requires. Most alloys containing sixty-five per cent. of silver amalgamate tardily, but bismuth removes all of this, and makes the amalgamation quick and easy. The working property is very soft, and the mass so springy that it is difficult to make good margins for microscopic examination, or to make the margins close all around the filling at the same time. When it is touched at one place it will spring away in another. The amalgam is very dark. The expansion shrinkage range is reduced, the flow is increased, and the resistance to crushing is reduced.

Cadmium.—This is emphatically the active element. Its expansion of one hundred points is made in nine days, then there is a drop of one point within five days, after which it remains stationary. But annealing removes nearly all of that, so that its range is ninety-five points. It requires a large amount of mercury, sets as quickly as the zinc alloy, and must be worked quickly even when fully annealed. The amalgam is very white, and the fillings are beautiful. In its expansions it slips squarely up the margins, if the walls are smooth, and remains flat on the surface. The flow is increased.

Lead.—The principal reason for adding this alloy was the fact that our metals are so frequently contaminated with lead that I thought it well to know what effect it might have. It amalgamates almost as readily as that containing bismuth. The working property is very soft; the setting is slowed enough so that the fresh-cut alloy gives plenty of time. The amalgam is very dark. The expansion shrinkage range is unaffected, and the flow is increased.

Aluminum.—My first effort to make a filling of the alloy containing five per cent. of aluminum was a failure. It amalgamated nicely, forming a very white, soft mass, but it was soon too hot to handle.

I lapped it about the bulb of a thermometer the best I could, but imperfectly, and the mercury ran up to 186° F. By the time I was through with this observation the mass had begun to fall into a dark powder, and very soon seemed to have disintegrated. I found that the dark powder would cohere a little when pressed together, and tried to make a filling of it, but was only partially successful. After a few efforts I succeeded in making a filling, and finally several, of the soft mass before the disintegration began. When packed into the tube it did not disintegrate, but the tubes became very hot,—much too hot to hold in the hand. In handling the material I received the impression that a gas was being formed. The steel tubes, and the instruments used in packing, were corroded and darkened. The fillings made have expanded enormously. That which I thought the best filling at the time of making gave during the first twenty-four hours an expansion of 120 points; at the end of the second day 181; at the end of the third day 217 points; and so on diminishing, but it did not stop. I followed it for forty-three days, when it passed beyond the capacity of my micrometer, having made 445 points expansion. Now, after a little over two months, it looks as though one-fourth of the material was above the margin of the cavity.

In considering aluminum, it should be remembered that it is so light that five per cent. by weight is nearly twenty per cent. of the bulk. I therefore made new ingots with one per cent. of aluminum, retaining the proportion of 65 to 35 between the tin and silver. In mixing this with mercury the heat developed was not too great for ordinary handling, but other phenomena occurred that may be of interest. The mix was kneaded as usual, and made a very nice pliant mass. While this mass was on the scale-pan being weighed I thought I saw a movement in it, and watching it closely I saw that it was swelling up and becoming larger. On placing it in the palm of my hand and rekneading it, a distinct crepitus of bursting gas-bubbles was heard. This gas was kneaded out and it reformed, and was again kneaded out. After repeating this several times the filling was made. This phenomenon occurred with every mix of this alloy, and there can be no question as to the formation of a gas. Even after the gas was several times kneaded out and the fillings made, the surface was more or less blistered with forming gas-bubbles. When first mixed the mass was very white, but in connection with the gas formation it became dark in color. The working property of the mass is soft and the setting slow, so that there is plenty of time, and to spare, in making fillings of it. When annealed it was very slow in setting; and the mass was peculiar for its combined softness and apparent dryness. It also exhibited the same gas formation. The filling from the fresh-cut alloy gave an expansion of 166 points during forty-four days that it was followed. Like the zinc alloy, it adheres to the walls of the tube and rounds up in the center, and the surface had become so much rounded that the steel disk fixed in its surface for the contact point of the micrometer fell away, and the measurement was lost. During the last four days there had been an expansion of four points. The fillings from the annealed alloy gave expansions from twenty-five to forty-eight points; that sample annealed in boiling water expanding the most, and that annealed one week at 130° F. expanding the least. These expansions were very slow, and presented the remarkable phenomenon of being stationary from the beginning of the second day to about the fifth day (all of the fillings from the annealed alloy), when it began again slowly, and continued about forty days.

This series of ingots and the test fillings from them will give a good idea of the modifications produced in alloys by the addition of the elements named. Whatever may be our notions about them, the instrumental facts are not likely to be essentially modified by future investigations. It is possible that much light may yet be thrown on the conditions of the modifications, and many changes made in that way; and combinations of the modifying metals may effect changes. The table presented will furnish a basis for further search in these directions. There seems to be no reason why we should not have white alloys, but it is clear that we must be very cautious in the use of zinc for this purpose. The formula, silver 68.5, tin 25.5, gold 5, zinc 1, has now been watched long enough to assure its success. The amalgam is very white, requires a long time in annealing to produce a good working property, and has good strength. The formula silver 68.5, tin 25.5, gold 4, zinc 1, bismuth 1, is also successful as to shrinkage and expansion,—has a little softer working property, but is not so white nor so strong as the former. I think it quite possible that its action may be different in some degree if it is first combined with copper, for which it seems to have a strong affinity. But these are matters that will have to be determined by strict experiment; no speculative determinations will answer our purposes. And yet I shall expect determinations made from this table to limit experimental work to a narrow compass, and render the finding of formulæ for alloys of satisfactory chemical qualities, that have also good physical qualities, a matter of little difficulty.

A study of the two tables presented with this paper, in comparison with the table illustrating shrinkages, published last summer (COSMOS, August, 1895), will be interesting to many of my readers. My instrumental facts were correct last summer, but in the study of them I knew nothing whatever of the modifications produced in alloys by thermal influences, and therefore went badly astray in some of my deductions. In the comparison of the tables it should be remembered that most of the alloys studied last summer were as found on the market, and nothing was known of the age of the cut, or of the artificial ageing to which they may have been subjected. When a comparison of the tables is made with this clearly in view, the reader will understand why some radical changes of opinion should appear.

In the course of experimental study this summer a number of lines have been followed out that have come to naught as to practical results, but which have an interest from the scientific standpoint. This paper is much too long to think of including them, but some of them may form the basis for future writing. For the present the work must be laid aside and give place to other duties. The subject is by no means exhausted. Besides finding suitable formulæ for white alloys, there is need of much more work in the experimental way before we know all we need to know of dental alloys. But the studies now presented seem to me sufficient for the beginning of a radical improvement in the production of dental alloys by manufacturers. I wish it understood that I have no intention of manufacturing alloys myself, and that any one who will provide himself with the necessary instruments, and attain the requisite skill in their use, can manufacture alloys on the lines I have indicated, and improve the plans. Furthermore, I have had many letters asking advice as to what alloys to use. I cannot answer these questions further than they are answered in the publications I may make from time to time. Operators must depend upon the regular lines of trade for their supplies of alloys, and if alloys manufactured on the lines I have indicated are wanted by the profession, I think our manufacturers may be depended upon to produce them. It is their part of the business to supply the material required by the dentist, and in the past they have not been slow in complying with the demand, and we have no reason to expect that they will fail us in the future.

SHALL IT BE CATAPHORESIS?

BY THOMAS DUNCAN, OF THE FORT WAYNE ELECTRIC CORPORATION, FORT WAYNE, IND.

(Read before the Northern Indiana Dental Society, Kendallville, Ind., September 24 and 25, 1896.)

PART I.

It is a known fact that if we take a vessel with a porous partition which divides it in two, and fill each to the same level with a liquid, then place the positive terminal of a voltaic cell in the liquid on one side of the partition, and the negative on the other, the liquid on one side will be noticed to rise higher up in the vessel, while the other will undergo an equal but opposite change,—*i.e.*, its level will gradually fall from where it originally was. This phenomenon was first noticed by Porret, who described it as electric osmose. He also noticed that it was most manifest when the liquid was semi-conducting, or, to use a more modern phrase, "a poor conductor," such as alcohol and bisulfid of carbon. This transfer through the porous partition or diaphragm takes place in the direction of the current, or from the anode to the cathode side of the vessel. Hence, we have a condition which transfers the liquid from the anode or positive side of the bath, and deposits or empties it at or around the cathode or negative element.

This property of the electric current, although known for many years, has lately been utilized in medicine for the purpose of carrying lotions and other preparations through the skin, to swellings and other affected parts of the body. Its latest utility, however, is in dentistry, where it is being successfully employed for obtunding sensitive dentine. The *modus operandi*, as identified with the use of cocain and guaiacol in this respect, is well understood by the up-to-date practitioner, and need not be dwelt upon here. Suffice it to say, however, it marks an interesting epoch in dentistry, and one that cannot help but prove to be a blessing from heaven in eliminating that dreadful fear of the dental chair.

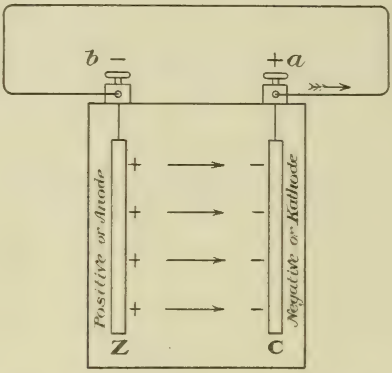
I had the pleasure a few weeks ago of witnessing for the first time the obtunding of sensitive dentine by the electric current, and which proved to be very successful. One feature of what I recognized, however, I think would bear investigation, and that is the name given to the process or treatment, "Cataphoresis." I admit it has been used for years, but let us analyze it from various points and see if it is correct. First, what do we mean by cataphoresis? To intelligently answer and understand it, let us go back to the origin or bed-rock of the matter, where we will have to introduce Dr. Michael Faraday (popularly known as the Father of Electricity). When Faraday was experimenting with the voltaic pile or cell (and which is sometimes erroneously called the galvanic battery), he gave us the words anode and kathode to represent the two elements contained within the solution or electrolyte. The anode he said was to be the element or pole from where the current started, as it were, then through the electrolyte or exciting solution; and the kathode or negative pole or element was the other, or one to which the current flowed after passing through the solution. If we take the simplest form of cell, wherein are employed a strip of copper and a strip of zinc immersed in a solution of sulfuric acid and water, we find from Faraday's nomenclature that the zinc will be the anode and the copper the kathode, because the current starts from the zinc (or the element that is consumed), through the acidulated water to the copper. Therefore, it must always be borne in mind that the anode or positive pole inside a cell is that which is consumed or decomposed or eaten away, as it were, and the point from which the electricity originates or commences to flow. The other, or kathode, is the one to which it flows before leaving the battery or cell to flow in the outside circuit.

The foregoing, however, has only dealt with the poles of the voltaic cell as contained within the electrolyte or solution.

Another condition of affairs presents itself when we come to consider the matter as viewed from the terminals outside of the cell. We must forget for the moment what polarity the parts inside have in order to prevent confusion. It has already been stated that the positive or anode point in the circuit was that from which the current came or from which it emanated. If this be the case, and it always has been, then the positive terminal of the cell will be that terminal out of which the current comes and enters the circuit, and this will be the top of the copper strip. This then gives us a condition in which the outside terminals have the opposite polarity to that of the elements or poles immersed in the solution. This is better understood by referring to Fig. 1, in which Z represents (on left-hand side) the zinc element and the positive or anode; C the copper element and the negative or cathode. In other words, the positive or anode element Z is the cathode or negative terminal *b* of the outside circuit, and the negative or cathode element C becomes the positive or anode terminal *a* outside the cell. We now come to why Faraday called these terminals anode and kathode. He wanted to name them so that their meaning would indicate what relation they bore to the circuit of which they formed a part. The positive, or that point or terminal from where the current comes up out of the cell, he called the "Anode," from the Greek word "Anodos," meaning a way or road up, and which is itself a derivative from the two Greek roots "Ana," up, and "hodos," a way, a road. Therefore, the anode terminal is the way or one up through which the electricity comes into the circuit, and represented by the letter *a* in Fig. 1.

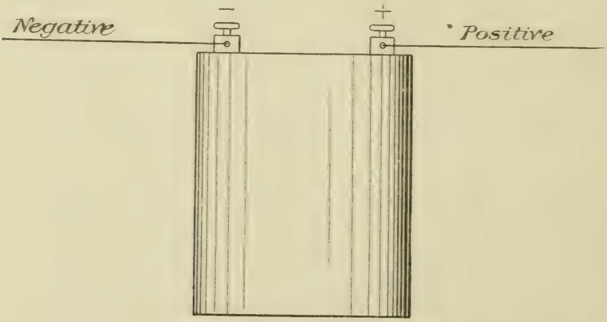
The kathode he named for the terminal through which the current went down again into the cell. This is so called from the Greek word "Kathodos," meaning the way or road down; kathodos being a derivative from the two Greek roots "Kata," down, and "Hodos," a way. When the current re-enters the cell at the negative terminal *b* it passes down to zinc Z, leaves it (making it positive) to enter the copper or negative point inside the cell again, then out at *a* through the circuit again. Kathode is now spelled cathode.

FIG. 1.



In practice we must forget about the elements inside the jar and confine ourselves entirely to the outside terminals, these being the points of utility upon which this paper is based. This presents to our view a condition as shown in Fig. 2, in which only the outer binding posts and circuit are considered.

FIG. 2.



The terminal *a* in Fig. 1 is marked + (plus), which is also denoted by the words positive and anode. The terminal *b* is marked — (minus), and which is likewise known by other names, such as negative and cathode. This gives us the following names for *a* terminal: plus, positive, and anode; and for the terminal *b*, minus, negative, and cathode. The most common, however, are positive (*a*) and negative (*b*). Now, which of these terminals is employed when obtunding dentine? We know that in electric .osmosis the liquids, and that which may be dissolved therein, travel, or are carried, from the positive to the negative, or from *a* to *b*; hence we must use the positive or anode terminal, or electrode, to apply to the tooth. If this positive electrode is the most important, and the one which is used in direct contact with the solution of cocain and the dentine, why not give it identity by name in the results accomplished, and call this branch of electric osmose as associated with dentistry "Anaphoresis"? But you say it is already called and recognized as cataphoresis. Now we come to my first question, What is Cataphoresis? It means a "traveling downward," and is a derivative from the two Greek roots "Kata," meaning down, and "Phorein," to travel. We have already said that cathode was from the same Greek root "Kata," therefore cataphoresis must bear relation to, and be closely identified with, the cathode terminals. But upon second thought, we only use the anode or positive terminal, or electrode. Therefore we cannot apply the word cataphoresis when using the anode, but ought to use the term "Anaphoresis" instead.

It might with equal force be argued that since the tooth itself acts as the cathode or negative part of the operation, and its being the part also into which the cocain is caused to operate, it should be accepted as being properly represented by the term cataphoresis. This, however, does not appear to be strictly in accordance with the present nomenclature and state of the art.

If we ask any person who is versed in the use of voltaic cells, and the terms anode and cathode, "which is the proper term to apply in a case where the positive terminal of a battery is used?" he could not help but say anaphoresis. Why? Because he knows that the term anode and anaphoresis can only be used in conjunction with the plus or positive terminal, or electrode. If you tell him it is the minus or negative binding post, or electrode, that you apply to the tooth, he cannot help but adopt the word cataphoresis, since it is only to the minus, negative, or cathode that cataphoresis relates. If either of these two terms must be adopted, I should propose "Anaphoresis" as being the better, since it not only gives us exactly by its prefix the name of the pole or terminal of the battery employed, but would also prevent a great deal of confusion in practice. If there is no marked tendency to adhere to these terms, it would be much better to adopt one that would not be so confusing.

If we say "anodal diffusion," we at once recognize its meaning in a broad sense in electro-physics; but if we should say "anodental diffusion," we immediately note its application to dentistry. Anodental would mean the application of the anode or positive terminal of a battery to the tooth.

Why not speculate a little further and propose "electrodental osmosis"? This would signify the application of electric osmose to dentistry, or the use of the electric current for the production of osmosis in the treatment of the teeth. This term would apply equally well to either obtunding sensitive dentine, or bleaching of the teeth. I do not wonder much at Dr. Morton, who, in his address before the First District Dental Society of New York State, on December 10 last, making exception to this term, and taking it upon himself to call it electro-medicamental diffusion, which covers the entire art of forcing medicaments into the system with the assistance of the electric current. We could, with reserved propriety, slightly change this title, and bring it closer into contact and identity with the dental art by calling it electro-medicodental diffusion, or what I might further suggest as being much more proper, "electro-medicodental osmosis." Other terms might be applied, such as electro-dentistry, and electrodental anesthesia. In the adoption of a proper title for this application of electricity, I think valuable assistance could be given by the American Institute of Electrical Engineers, if the matter was brought to their notice.

PART II.—*Measurement of the Electric Current.*

At the terminals of a voltaic cell or battery, there is what we term a difference of electrical potential or pressure. If no wire or circuit is connected with these two points, this pressure merely acts through the air, and which, owing to its high resisting qualities, is classed as an insulator. Therefore, no current will pass from one binding post to the other. If we now connect a wire across from one terminal to another, we have a circuit which allows the electricity to flow from the positive to the negative side of the battery. The introduction of this wire is analogous to putting a pipe into the bottom of a barrel of water to let it seek or follow a path to a lower level. If we put in a very small pipe, we allow a very small amount of water to flow, because its resistance to allow a flow is large on account of its diameter being small. If we replace it with one having a bore or hole of twice the area, it permits twice as much to flow through it, because its resistance is halved,—that is, its resisting power is reduced by making the hole larger. In dealing with the measurement of electric current, we have precisely the same conditions to entertain.

If the wire connecting the two terminals of the battery together has a small or low resistance, then a greater amount of current will flow than when a wire of higher resistance is used. In order to fully understand the relations that current, pressure, and resistance bear to one another in electricity, I will have to introduce at this point what is called Ohm's Law. Briefly stated it is: "That the current flowing in a circuit is equal to the pressure divided by the resistance of the circuit." These terms of current, pressure, and resistance are also recognized by the name of the unit which represents them, as follows: The unit of current is the ampere, the unit of pressure the volt, and the unit of resistance the ohm, the latter being named in honor of Dr. Ohm himself. By reverting again to Ohm's Law, we have the amperes equal to volts divided by the ohms,—that is, the current in amperes is equal to the electromotive force or pressure in volts divided by the resistance in ohms.

This same law of Ohm's can be expressed so that any two of these three units may be used to find the third or unknown; they are stated as follows:

Current = Electromotive force ÷ Resistance.
Resistance = Electromotive force ÷ Current.
Electromotive force = Current × Resistance.

To be more elementary, we can express them thus:

Amperes = Volts divided by ohms.
Ohms = Volts divided by amperes.
Volts = Amperes multiplied by ohms.

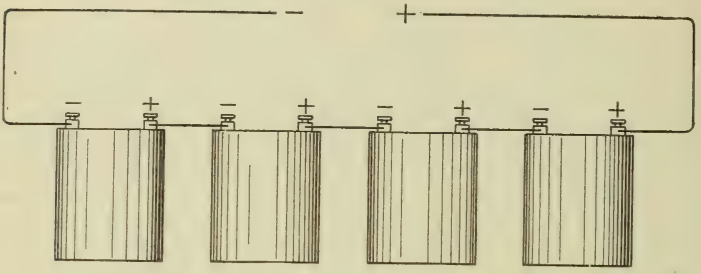
Having these implanted in our minds, we can at once proceed to determine just how much current we have flowing in a given circuit when the volts and resistance are known. Suppose we have a wire connecting the two terminals of the battery together, having a resistance of one ohm, and the voltage or pressure of the battery is one volt, what is the current flowing in it from one terminal to the other,—*i.e.*, from the positive to the negative? We said that current was equal to volts divided by ohms, therefore, if the voltage of the battery is one volt and the resistance one ohm, the current must be one ampere, or 1 divided by 1 = 1. If we have a battery the voltage of which is 2 volts and the resistance on the circuit is 2 ohms, what is the current flowing? It will be 2 divided by 2 = 1 ampere also. This is because we have doubled the resistance in ohms as well as the pressure in volts; but suppose the resistance of the circuit had been the same as in the first example, which was one ohm, what current would flow through it? It would now be 2 volts ÷ 1 ohm = 2 amperes. Having this formula or law, we are enabled to find out the amount of current flowing in any circuit. Let us take, for instance, a case in which the wire circuit from positive to negative is replaced by the human body,—that is, some one takes one of these terminals in each hand, so that the circuit is completed through the body, what current will pass? The voltage of the battery is 2 volts, and suppose the resistance of his body be 5000 ohms or units of resistance, the current in amperes will be 2 ÷ 5000 = .0004 (four ten-thousandths of an ampere). In the measurement of such small currents of electricity, it is common practice to use the term or sub-unit milliampere, which means the one-thousandth part of an ampere or unit. Hence, if we have .0004 ampere, it means $\frac{4}{10}$ or $\frac{2}{5}$ of a milliampere only. These insignificant amounts of current in the electric lighting and power business become a goodly portion of that subtle agent when applied to the nerves of the body.

Obviously, if we have a milliampere meter in circuit, and know the voltage of the battery, we can at once compute the resistance in circuit. Let us take the experiment tried in obtunding the tooth of a patient recently, and from the data taken at that time the milliampere meter registered something like three-quarters of a milliampere. I understood from the gentleman in charge that the case contained eighteen cells of about one volt each. This then will give us in all 18 volts with the meter showing three-quarters of a milliampere, and what we want to find is the resistance of the circuit, including the body from tooth to wrist. I have already stated that resistance in ohms is equal to volts ÷ current in amperes, hence we have 18 volts divided by three-quarters of a milliampere, or 18 ÷ .00075 = 24,000 ohms. Of course, the body may not offer all this resistance, as a portion of it will be in the rheostat used for controlling the current. This rheostat is put in circuit expressly for this very purpose, that is, for modifying the strength of the current by varying the resistance in the circuit.

With another patient, the instrument indicated 2 milliamperes with the same pressure, which would give us as the resistance in circuit in this case 18 ÷ .002 = 9000 ohms.

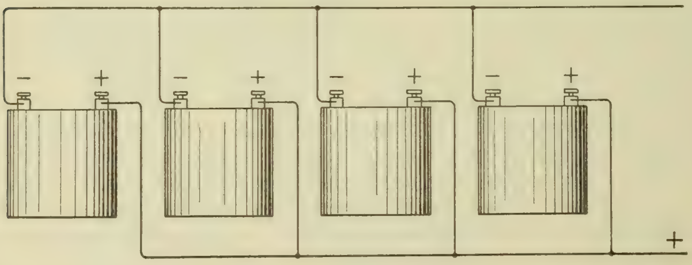
We know from what has preceded that if a certain current is flowing and we double the resistance of the circuit by interposing or adding it with a rheostat, the amount of current will be halved. We have had an example for finding the current when the volts and ohms were known, also the ohms when the current and volts were known. Now, let us find what is the required pressure in volts when the ohms and current are both known. The current we say is three-quarters of a milliampere in the first experiment, and the resistance of the tooth and other parts of the body used as a circuit, also the rheostat is 24,000 ohms, what is the volts? If the volts = ohms × amperes, then 24,000 × .00075 = 18 volts. This is the number of volts required to force three-quarters of a milliampere through a resistance of twenty-four thousand ohms.

FIG. 3.



By connecting the cells in series, that is, by joining the positive of one with the negative of the next, and so on, we add their pressures or volts as it were, as shown in Fig. 3. If each cell has a pressure of 1.5 volts and ten are joined in series, the total pressure at the two outside terminals will be 10 × 1.5 = 15 volts. This method of connecting is called that of intensity. The other method is called that of quantity, and in which they are joined up as shown in Fig. 4. In this, all of their terminals of the same sign or polarity are connected together, so that they now add together the sum of their currents or amperes instead of their volts or pressures.

FIG. 4.



It might be somewhat interesting to know just how much power was consumed or required to perform the first experiment. The unit of power or rate of doing work is the watt, and is equal to the volts × current, therefore the watts will be 18 volts × .0075 amperes = .0135 watts. This amount expressed in horse-power will be .0135 watts ÷ 746 = .000018, — eighteen one-millionths of a horse-power. If we look at it from a point of comparison with the electric incandescent lamp, we arrive at the following result: A 16 c. p. lamp takes say 50 watts, and if the number of watts necessary for electro-dental osmosis be only .0135, then the power consumed by the lamp would be sufficient to maintain simultaneously 50 ÷ .0135, or 3703 dental chairs. If the power for one operation was taken from the electric lighting service mains, and was used continuously one hour per day, it would cost at the same rate as that of the lamp,—viz, 20 cents per 1000 watt hours, the following: 1 hour × 365 days = 365 hours × .0135 watts = 4.9275, or practically 5 watt hours, which at 20 cents per 1000 would be one-tenth of one cent per year.

ESTHETICS IN DENTISTRY.

BY J. N. FARRAR, M.D., D.D.S., NEW YORK, N. Y.

(Address before the First District Dental Society of the State of New York, October 13, 1896.)

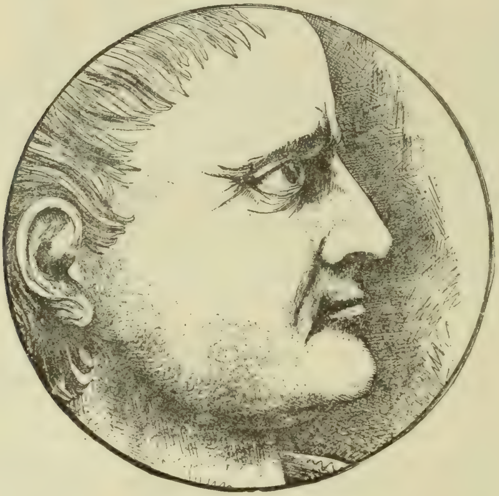
MR. PRESIDENT AND GENTLEMEN: This evening I shall not present to you a set paper, but shall *talk* upon the subject of irregularities of the teeth and their correction; first upon the esthetic phase of the subject, second upon the mechanical phase. This field of dentistry is too broad to be covered in one talk; indeed, it is not easy to select any one phase of it and exhaust it satisfactorily in one hour.

We all know that different persons differ in ability in the same calling. This is owing to differences in brain-action, differences in the faculties of perception, conception, and judgment. To make this more clear, let us go further. It is well known that the brain is not equally developed in all persons, nor is every brain equally developed in all its parts; and as each part of the brain has much to do with its special mental faculty, so must each faculty correspond with the condition of the part evolving it. If one part of the brain is deficient, or if it is abnormally developed, the product corresponds. Two dentists may do equally fine mechanical work; one set of teeth will improve the facial expression of the patient, while the other will injure it; so one dentist can regulate a set of teeth and make an ugly face beautiful by making the different features harmonize, while another dentist may even the teeth, and yet ruin the facial expression. One dentist has esthetics in his mental composition; the other none. While upon this point, I have enlarged sufficiently to make it clear, for it is my desire to show why it is that there are such wide differences in the results of operations by different persons in the calling of dentistry. Facial deformities may have their causes in the arrangement of the teeth, or they may be wholly within the face, or both. The number of those cases where the defect is confined to the face is comparatively small, while the number in the next class is very large, and the forms of the irregularities are various. An example of the first class may be illustrated in a case having a face that is too full on one side and deficient on the other, and yet the teeth be regular, so far as their being in line is concerned. Examples of the other class are the jumbled teeth, the protruding, receding, lop-sided, the too narrow, too wide, too long, and the too short arch.

As exactness in nature is never found, we, as dentists, are not expected to accomplish perfection; in fact, it is a question whether we would fully satisfy the esthetic eye if we could, for we have learned that there is such a factor as beauty in slight variation, and variation implies somewhat less than perfection. Some facial deformities can be corrected so as to balance the facial expression, and some cannot, but all cases can be improved by skillfully made machinery, guided by sound judgment, artistic, esthetic.

There is harmony in nature; consequently there is such a fact as harmony in variety. Human admiration of human beauty is universal, but different persons differ in their ideas as to what constitutes the highest beauty. Is this evidence that there is no law in beauty, or is it evidence of differences in brain-action in the judges, similar to those that cause differences in judgment of music, etc.? Correction of irregularities of the teeth implies doing away with those irregularities, but the scope of "orthodontia," as it is called (I don't like the term), embraces more than simply evening the teeth in the dental arch. In the highest sense it means moving of teeth in directions and to the extent which will improve, to the highest possibilities, the facial expression and facial contour. It may mean an arrangement of the teeth that will leave them on an even line, or it may mean an arrangement that will leave them in a slightly uneven line, depending upon the outline and general form of the face. To move irregular teeth so that they will be in an even line requires skill, but to so regulate and poise teeth that they will improve the facial expression and contour of the face requires higher skill, denoting a higher grade of judgment.

FIG. 1.



Balanced features.

Every normally formed face is supposed to express more or less of the true character of the mind. It is not every face, however, that can be called beautiful, nor is the form of all the features of every face found to be balanced, but perhaps they are sufficiently so to make the rule that faces generally correspond with the mental character. Of course, we must not stop to go into the exceptions, and discuss why the fact that beautiful faces are sometimes associated with most unlovely dispositions, but we must pass on to the question of balancing the face by moving teeth.

I here show a large picture (Fig. 1) representing an approximately well-balanced face. You will notice that all the features harmonize, and each one balances with each and all; the forehead, eyes, nose, and those features below the nose, the lips and chin, when seen sepa-

FIG. 2.

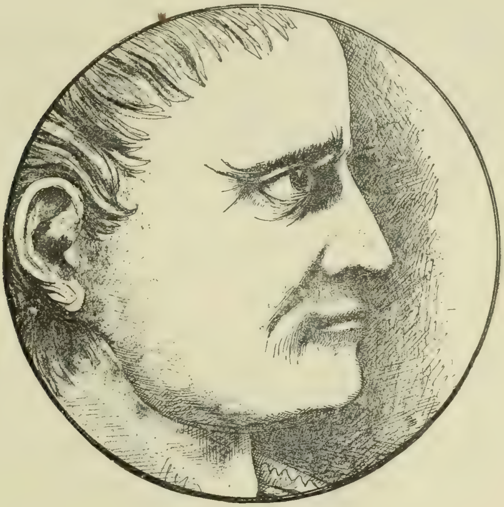
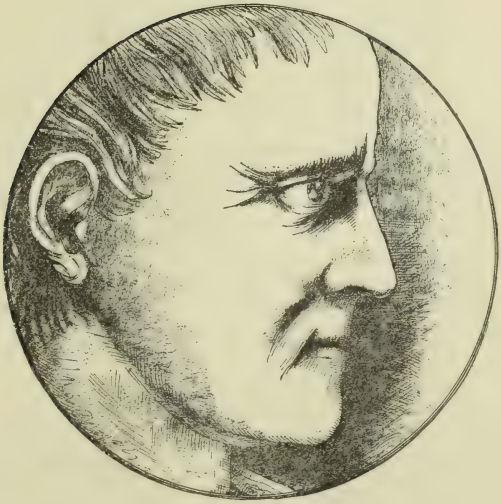


FIG. 3.

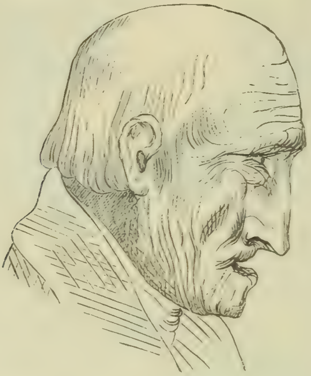


Too long teeth.

rately, bespeak the same strength of mind, a mind calculated to lead men. If I hide by these two cards every feature excepting the forehead, you will see that this feature indicates great strength of character. If, again, I hide all the members excepting the nose, the same kind of character is indicated; so in the same way, the eyes, when seen alone, show a corresponding mind; the lips and chin, also, when seen separately or collectively, belong to a man of genius. Every part of the face indicates the same mental caliber, the same power, the same strength of mind.

Now, suppose that man had lost his teeth, and he had gone to a dentist having but little judgment of esthetics, and he had inserted artificial teeth that were too short, the result would have shown that the face had been thrown out of balance, the lower part losing much of its strength, a weakening, as represented by Fig. 2. So, also, would have been the case had the dentist inserted teeth that were too long. The face would have lost its balance, as shown by Fig. 3. Though the latter two facial expressions differ somewhat, both show a weakening of that once grand and heroic face that led mankind, and the weakening would amount to the grossness here represented. By the illustrations you may understand what I mean by value of esthetics in dentistry. As great as is this deformity of face, greater than had he no teeth at all, it does not exaggerate the every-day facts found upon the streets to-day. But some dentist may say that while the part of the face below the nose may become deformed, it does not injure the real strength of the mind. Well, this may and may not be so. I have seen persons in whom such deformities had affected their minds considerably, and I have known such injured minds to improve upon the deformity being corrected. But highly sensitive and proud persons are more liable to be injured by facial deformity than those who are less sensitive and proud. Perhaps this is oftener shown in women than in men. Take a once beautiful woman who has thus become afflicted, and she will sometimes brood over it so much that she will lose her pride, and loss of pride is the forerunner of weakening of the mind; while on the other hand, a woman who is conscious of being beautiful, and having fine presence,

FIG. 4.

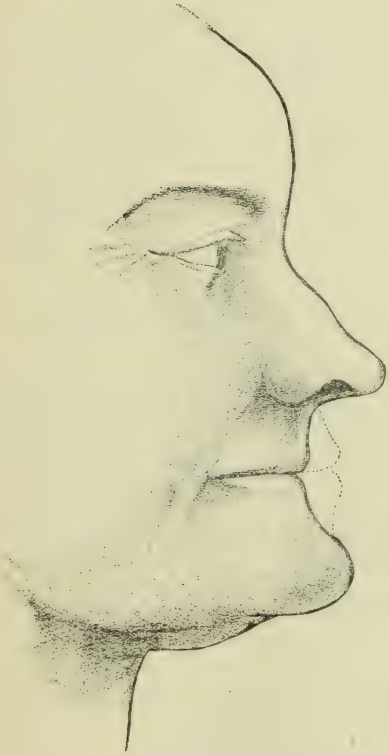


Effect of old age and loss of all the teeth.

is sustained, if not elevated, by it; her mind strengthens by the respect shown her, provided she has common sense and is not vain. All men as well as women feel these deleterious influences, and we all dread the changes that must come over us on the far-down hill side of life, a condition of face shown by this familiar picture (Fig. 4), that represents the edentulous old, old man, with a nose and chin that would come in contact were the fallen part raised to its extreme position.

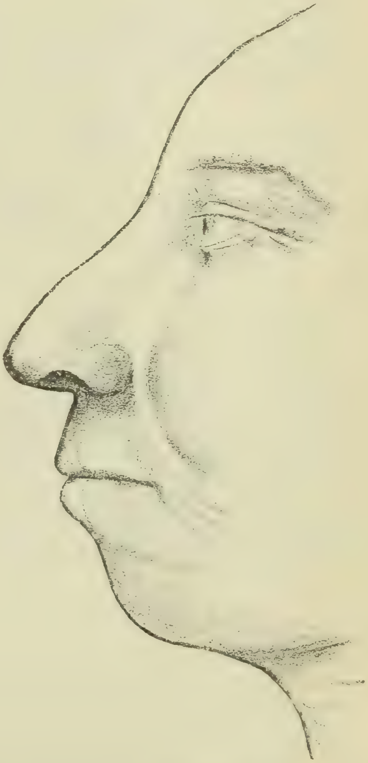
In the faces of mankind we find the active and passive expression. In the marbles of the Greek artists we find more of the latter represented than we do of the former. In fact, the Greek ideal is generally passive. I show you here several representations of these that I selected from a lot that I teach from. You will notice that all the faces have a peaceful and undisturbed expression, representing the god-like character, an expression of dignified repose.

FIG. 5.



Face of small curves.

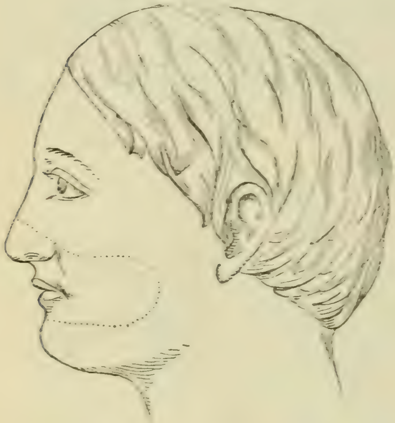
FIG. 6.



Face of long curves.

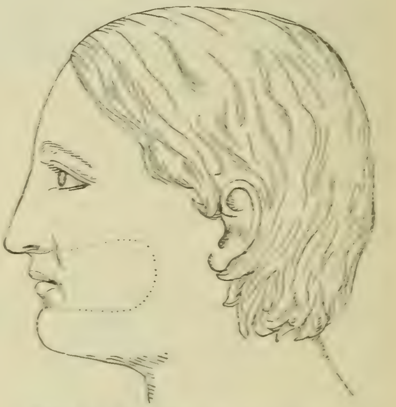
Leaving the Greek ideals, I will show you a specimen of two classes of faces, the extreme oval, the face of large curves, and the face of small curves. These are not intended to represent perfect faces, but two extremes of contour shown in profile. One is the face of a weak person, with sloping forehead and receding chin, connected by a bowed nose and full (not large) lips; the other a full forehead, Grecian nose (not aquiline), and small, prominent chin, but somewhat receding, all corresponding in general outline, making a profile in small curves. (Figs. 5, 6.) Neither of these faces are beautiful, nor are they deformed, but balanced throughout. If the teeth and lips of the second case were to be drawn in, it would injure rather than improve the profile, and to move outward the teeth and lips of the first case would disturb the harmony of the uniformly small curves of the face. These extremes of outlines might be said to be seldom met with, but it is by such extremes that I can best make myself understood.

FIG. 7.



Field of facial change by loss of the teeth.

FIG. 8.



Field of facial change by correction of irregular teeth.

By the next two pictures (Figs. 7, 8) I show you what I denominate the two fields of possible alteration by the loss of teeth and the change in the position of teeth. The part of the face surrounded by the dotted line in Fig. 7 represents the field of change by loss of teeth, and the part surrounded by the other line in Fig. 8 the field of change that can be made by moving the teeth. The areas of the two fields are somewhat alike, but in the former the cartilaginous part of the nose, that lowers in edentulous old age, is included.

(To be continued.)

◆

CORRESPONDENCE.

REPLY TO DR. H. H. BURCHARD.

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—I want to trespass upon your valuable space to make a brief reply to Dr. Burchard's kind letter on my article on the temperaments.

In the first place, I must make a humble confession of that most flagrant sin on the part of a writer—a slip of the pen, by which I am made, by some evil genius, to write "Herodotus" for *Hippocrates*.

I have no defense to make, for my own first record is against me, and regret the annoyance the slip caused Dr. Burchard or any one else. Of course, the Greek writer meant was Hippocrates, the "Father of Medicine."

As regards the pseudo-scientific condition of our present knowledge of the temperaments, I entirely agree with Dr. Burchard. As St. Paul wrote to Timothy, we must beware of "science falsely so called." There is no doubt but that the study and investigation of the temperamental variations of individuals have been retarded by its association with and dependence upon the pseudo-sciences of phrenology and physiognomy. For this reason, perhaps, the whole subject has been thrown over by really scientific men as unworthy of their attention. So it comes about that the phrenological writers furnish us with the only literature we have upon the subject, and it is a pity that we must depend upon them for our knowledge and classification. We must awaken to the importance of the study and endeavor to place it upon a scientific basis. Dr. Burchard's suggestions regarding improvement of the classification are in the right direction ; but we need observations at first hand, beginning with the study of the variations of the individuals, and then a classification upon a more scientific basis.

I myself doubt if a classification based merely upon physiological variations will answer the purpose. Functional differences cannot be made to account for individual variations, for they bear a relation to the subject which is shared by pathology and are only incidental to the real causes. What those causes are we cannot yet make out satisfactorily.

For myself, I would prefer a zoological classification based on racial characteristics, which we know are far-reaching in their effects, and serve to account for the main anatomical features of form and color of every individual of our species. Our species is first divided into races with distinct anatomical characteristics and features ; races are divided into sub-races, which are far-reaching in their ramifications and can be traced for centuries through peoples and nations ; these are further divided into varieties, and these into breeds, which I would further divide and sub-divide by a system which would have a scientific basis. Upon this system should be set the further classification of physiological and pathological variations, idiosyncrasies, etc., which we so well know.

I admit that this system would be according to my bias, for I look upon man from a zoölogical standpoint, and am a zoölogist before all else. But it seems to me to furnish the scientific basis for which we have been looking so far in vain, for the classification of the conspicuous and persistent variations as found among the individuals of our race. I cannot but hope that the man will rise who is sufficient of an anthropologist, zoölogist, physiologist, and of general scientific attainments to furnish us with the much needed scientific system of classification for the temperaments.

I must take occasion to thank Dr. Burchard for his kind words in regard to my crude work upon the subject of the temperaments.

A. H. THOMPSON.

PROCEEDINGS OF SOCIETIES.

FIRST DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

THE First District Dental Society of the State of New York held a regular monthly meeting Tuesday evening, October 13, 1896, at the Academy of Medicine, No. 17 West Forty-third street; the president, Dr. John I. Hart, in the chair.

INCIDENTS OF OFFICE PRACTICE.

Dr. WATKINS, of New Jersey. There is a preparation known as ammonol, prepared by the Ammonol Chemical Company, New York. It is one of the coal-tar products. I have been using it for the past few months with much satisfaction in many cases. It is something that we have all wanted and felt the need of in practice, and it is the first thing I have ever used that has been beneficial in my hands for pericementitis, where, for instance, a tooth has been filled for a long time and all at once something creates a disturbance; the tooth is elongated, very much inflamed, and sore, and there is a great deal of suffering. By administering ammonol in doses of from five to fifteen or twenty grains, all inflammation will disappear in a very short time. In many cases soreness will disappear in a few minutes; in others it will take two, three, or half a dozen hours, or more, for all pain to pass away.

I will simply describe a case which came into my hands a few weeks ago. The tooth was a lower molar that had been filled for about ten years. Of course, I cannot positively state the condition of the pulp-canals, but my presumption was that they had been filled or partially filled, and the tooth had remained quiet all these years. It was a very large filling, taking in almost the entire crown. The tooth was exceedingly sore and elongated, and the gum slightly swollen. I did not feel like opening that tooth and spending considerable time trying to find the way down those canals, inasmuch as it was the middle of the night. I gave the patient ten grains of ammonol at that time, and directed her to take ten more at the end of an hour, and five more each hour thereafter until the pain ceased. She went home and took the other ten grains, went to bed and slept soundly. In the morning there was no soreness in the tooth at all. The next morning after that (about thirty-six hours after I gave her the first dose) some soreness was again felt. I then repeated the medicine, and the soreness disappeared. That one case will illustrate a number of cases where I have administered this medicine in a similar manner, and I think I can say that in almost every instance it has afforded very great, if not entire, relief.

There is another remedy that I have been using lately for injecting in the gum for extracting teeth. It is called eucaine, prepared by Schering & Glatz, chemists, in New York, and is a similar preparation to cocain without the danger. It is practically safe. You can inject from a six to a ten per cent. solution with safety, and extract any number of teeth absolutely without pain. It seems to be a harmless remedy, and easily prepared. It will not deteriorate, but will keep for an indefinite length of time. It should be prepared with distilled water, and then brought to the boiling point afterward. It can be used many times to advantage in crowning or working around the gum-tissue.

I will give one other illustration. I was putting a gold cap on a lower molar which had split on one side; the lingual surface had split off below the gum. The gum was ragged and bleeding and very sore, and in burnishing the crown to the root I hurt the patient considerably. I put a napkin in his mouth to keep it dry, and then took some of the hydrochlorate of eucaine and worked it around in the bloody gum, and kept it there for about three or four minutes, and when I began again it seemed as if I were working on a piece of leather. There was no feeling whatever. I have not tried it in cavities as an obtunder, but I presume it will be equally as good, if not better, than cocain.

Dr. HODSON. What are the indications for the dosage of ammonol?

Dr. WATKINS. I should regulate the dose according to the strength of the patient, the age of the patient, and the severity of the pain. If the patient is suffering severely, I would give a fifteen-grain dose.

Dr. McLAREN. Are the effects produced that we sometimes get from cocain, such as sloughing or swelling of the gums?

Dr. WATKINS. The gums will perhaps swell the next day, but no soreness accompanies the swelling and no sloughing. The swelling will disappear, and there is no harm done. That can be avoided, to a great extent, by rubbing the eucaine out toward the place where the tooth was extracted, and by being careful to apply some antiseptic before inserting the needle.

I would say also in regard to ammonol that it is an excellent stimulant, and yet a stimulant apparently without after-effect. For instance, I had a very hard day's work ahead of me a week ago. I took five grains of ammonol at three different times during the forenoon. I went through that day's work without any extra effort, and without feeling any fatigue at night.

The subject of the evening was then taken up and presented by Dr. J. N. FARRAR, of New York, entitled "Esthetics in Dentistry."*

Adjourned.

B. C. NASH, *Secretary.*

SOUTHERN DENTAL ASSOCIATION.

(Continued from page 931.)

SECOND DAY—*Evening Session.*

THE report of the Committee on Hygiene being called for, Dr. G. J. FRIEDRICHS made the following remarks, in lieu of a report, in order to present the subject for discussion:

---

* For the paper in full see page 999 of the current number.

The usual definition of hygiene as being "the art of preserving health" is defective, since it is more than art, because it aims to increase and improve, as well as preserve; and the word "health" is too vague to be of much value in this connection. In its broader sense, the study of hygiene includes the examination of the conditions which affect the generation, development, growth, and decay of individuals, of nations, and of races, being on its scientific side coextensive with biology in its broadest sense, including sociology, rather than with physiology merely, as writers state. As regards practical hygiene—*i.e.*, the prevention of disease—it is evident we may try to attain this end in two different ways, since we may either attempt to avoid or remove the causes of disease, or to make the body less susceptible to the action of these causes. Considering the great number of causes of disease, and the impossibility of shunning them all, even with the greatest care,—nay, that this great care, if exercised, becomes itself a cause of disease; on the other hand remembering that the power which we have to modify plants and animals by regimen and breeding makes it probable that the human body might in a like manner be improved, to use the phrase of Royer-Collard,* by a sort of hygienic organoplasty; it might at first sight appear strange that more attention is not paid to this branch of preventive medicine. Theoretically it is possible to thus improve the physical condition of the individual; and to be effectual it would be necessary to work in accordance with the laws of natural selection and prevent the production of weak and unhealthy persons; a problem which I fear none of us will live to see solved. Hygiene commences the moment when two animated, wandering, microscopic molecules meet and mingle into that one other which is to grow into what you and I are, until fifty, sixty, perhaps a hundred years after, its elements are given back to the cosmic storehouse whence they have been borrowed.

To the individual, the first object of importance from a hygienic point of view is the local habitation or home, for when once fixed he usually remains so for a considerable time, and this exerts a continued influence for good or evil. First requisites are thorough drainage of grounds; next, thorough ventilation of premises—for effluvia and organic vapors of various kinds necessarily become developed in every occupied dwelling—the proverb says that "cleanliness is next to godliness." Clothing adapted to the season and degree of individual exposure is also an important element of hygiene. The quality and quantity of the food, and the regularity with which it is taken, are of the next importance. It should be properly prepared and properly masticated; its digestion should not be interfered with by hurry, anxiety, or any unusual mental or physical disturbance at or immediately after the time of meals. Sufficient bodily exercise should be taken daily to keep all the organs of the body in a healthy state of activity, followed by sufficient periods of rest, repose, and sleep, for it is during sleep that the main process of the nutrition and restoration of the nervous and muscular system takes place. These conditions must be observed to retain and enjoy the blessings of health. For it is a principle which lies at the basis of hygiene, that causes of disease, however slight, by constant repetition day after day, or even longer intervals, will certainly at last undermine the health, and produce permanent and often irremediable conditions.

---

* Organoplastie Hygiènique: ou Essai d'hygiene comparée. Mem. Acad. de Med. 1843, X., 479 pp.

Dr. H. E. BEACH. Dr. Friedrichs's report contained nothing special in reference to dental hygiene, and I do not know that there is anything new to be said upon that subject.

Cleanliness is most essential to hygiene—cleanliness of the person, cleanliness of the premises, cleanliness in all things pertaining to ourselves, to our work, to our surroundings. Cleanliness certainly holds the first place in the science of hygiene. Those of us who have had dyspepsia will realize the importance of what Dr. Friedrichs said in regard to the hygiene of food, but in this respect no laws can be laid down. Food must be selected according to the individual constitution. One person can eat sweet things and grow fat on them and feel well, but cannot eat anything containing grease ; with another it is just the reverse. Every man must be guided, in the selection of food, by what suits his peculiar organism,—that which his stomach can digest. Very much depends upon the manner in which food is prepared for the stomach ; if it is not well prepared it will not be readily digested. The preparation of food depends upon the ability of the individual to masticate thoroughly, and here it is that dentistry comes in. Too often, in the services rendered by the dentist, too little consideration is given to the masticatory function of the teeth, though, fortunately, the class of operators who made the large V-shaped openings is rapidly passing away. Yet occasionally, even now, a patient will present and ask us if we cannot fill up those spaces in which the food becomes impacted so uncomfortably.

We should admonish our patients persistently on the point of oral cleanliness. When once the habit has been formed, patients will take it as a favor if we will make an examination at stated intervals to see if the teeth are properly cleaned. Teach them how to do it, for as a rule they don't know how until you have taught them. They may brush the teeth three or four times a day, and yet not get them clean. Impacted around the necks of the teeth will be found decomposing matter, with a glutinous substance around the gingival margins. Point this out to them. When such instruction is properly given it will always be appreciated.

Dr. J. Y. CRAWFORD. To me the most interesting of all subjects is this one of prophylaxis. I recently heard a discussion of the action of the ductless glands of the organism, the teachings of the discussion supporting a theory I have long held to on the subject of disinfection—antisepsis. A long time ago I embraced the idea that various fluids of the body have the function of sterilizing various articles of food. You have all observed how the lower animals dress their wounds, both their own and those of their young, with the tongue. The oral cavity furnishes fluids which are antiseptic in their character, and in proper quantity are capable of eliminating from the food qualities which unfit it for the stomach, rendering it sterile and innocuous. I once asked a distinguished physician what he thought was the greatest combatant of peculiar toxic influences in the system. He replied, alcohol. The addition of alcohol to food (and I am well aware that I shall subject myself to criticism in what I am about to say)—but it is an undoubted fact that there are many articles of food into which the introduction of alcohol as a sterilizing agent would prove very beneficial to the human system.

It is probable that in the future less stress will be laid upon the specific influence of micro-organisms as a factor in disease, and we will hear no more of it than we now do of the doctrine of hereditary transmission, which was once so prominent. Functional activity, or inactivity, will be found to be the great factor. Much of our modern practice in physical exercise has a contrary result to what was designed. The peculiar influence of physical culture tends to blunt many of the functions of the organism, as the sense of touch, for instance. Let a young college athlete take you by the hand, and he gives your fingers a grip that impresses you most painfully—he has no sense of touch. The dental surgeon should be the most finely organized human being in existence.

Subject passed.

Operative dentistry called.

Dr. E. P. Beadles read the following paper on

THE LINGUAL WALL.

At the risk of dwelling too much upon a hackneyed subject, I wish to say a few words upon it.

While dentistry is constantly widening its field, many things taxing our skill which heretofore have not been considered within our province, it is nevertheless true that the thing we do most, day in and day out, is the operation for preventing caries ; the checking of that destructive disease which so soon destroys the organs of mastication.

If any class of teeth is more important than another, that class consists of the four anterior superior incisors and the two cuspids. Hence, we exert our utmost skill to save not only the structure of these teeth but their good appearance. I do not mean to be dogmatic in this ; but will say that the method I have been pursuing for ten years has proven, in my hands, satisfactory in every way. The work is done with ease to myself and with comfort to my patients. It may be told in a word : the lingual wall is almost invariably removed. The method is so simple and the results are so good, I feel that surely every man here must do the same thing ; and but for the fact that many cases have come to my notice, from the hands of good operators where this had not been done, I would not refer to the subject.

This wall, in the majority of cases, is thin and weak, the gold cannot successfully be packed against it ; it is liable to crack or break subsequently. It is well known that it is a difficult thing to prevent a leak where the gold comes in contact with an enamel-wall. Another important reason for its removal is that you do not need nearly so much separation, as with this wall away the entire cavity is exposed to view by the use of the mirror. To my mind there is no good argument for ever leaving this wall, except under the most favorable circumstances, and in these cases I usually make a compound filling of gold and cement. The cavity is well shaped, with parallel walls, or undercuts if you wish, for the cement (seldom for gold alone). The cement is placed in somewhat soft, and small pieces of annealed gold are pressed in, as many as possible ; then the cement is allowed to harden, when the gold may be continued. This is an excellent plan when the labial enamel-wall is very thin and you wish to prevent the gold showing through.

By the use of the mirror and with a cavity prepared as described, each piece of gold may be carried to its place with perfect precision, and carefully and certainly packed against all the walls ; the cervical of course receiving attention first,—well covered and well burnished before proceeding further. Where the chances are at all favorable I do not know that I have had a failure in a filling of this kind in years. In fact, I believe it is impossible for me to improve further upon my own work in this respect, though of course every good dentist endeavors to do this with every operation. I use hand-pressure almost exclusively in these cases. I see no room nor need of mechanical mallets to annoy your patients, while they may sleep, if they like, under the gentle but strong pressure of the hand. Every man is wedded to his method ; this is mine, and I believe in it. If, perchance, there is one who would like to try this, I feel sure he will not regret it.

Dr V. E. TURNER. I have had some conversation with Dr. Beadles on this subject, and it is a surprise to me that so few men have adopted this method. It is certainly the best method of approach to the cavity. I have been surprised to find some men who say they never cut away the lingual wall, but always enter from the labial surface ; but that is because they do not use the mouth-mirror. It is my hobby ; I use it a great deal. In fact, all cavities that are not plainly in view I fill with the aid of the mirror, and much of my work I never see with the unaided eye. I do not say that my work excels in any particular because of this fact, but I do say that it aids in the preservation of health, enabling you to maintain an erect position, instead of bending over and stooping in cramped, inconvenient positions in order to get a direct view of the cavity. I do not mean literally that I never see the inside of a cavity, but it is a great comfort to me to be able to stand perfectly erect, day after day ; and my work is much less fatiguing than if I were compelled to bend and stoop over to get a view of a cavity, as I see some men doing. It is of great importance to the dentist to pay due regard to the preservation of his health. A man will soon find himself considered a "back number" if he is not physically able to perform his duties along the same line as men of the younger generation. As a man grows older his judgment has matured ; he is more accurate, and should then have reached the most useful time of his life, and he should pay due regard to the preservation of his health that he may be able to utilize the advantages gained by experience.

The committee appointed to take into consideration the matter of the proposed consolidation of the Southern Dental and American Dental Associations presented the following report :

"*Resolved*, That after due consideration the committee advise that the Southern Dental Association meet at Old Point Comfort next year, and invite the American to meet with us, that the question of consolidation of the two societies may be further discussed and finally disposed of."

A general discussion of the subject followed the reading of the report, which was continued until the time for adjournment of the session. The subject was therefore continued until the next session.

After the close of the session Dr. C. EDMUND KELLS, Jr., New Orleans, La., gave an interesting demonstration of the Roentgen ray phenomena, having with him a Tesla coil for the purpose of this exhibition. Dr. Kells also exhibited his method of taking skiagraphs of the roots of the teeth *in situ* in living subjects. These pictures being direct shadowgraphs he explained that it is essential that the object be as close as possible to the plate upon which it is to be produced, and at the same time that their plane surfaces should be parallel, to prevent distortion. Therefore, for taking skiagraphs of the teeth, a plate-, or rather film-holder, is made, containing a pocket for holding the film as close to the bone as possible, and having articulating surfaces into which the teeth bite down, thus holding the film absolutely steady during the sitting. Hard rubber, gutta-percha, or any such material may be used, but aluminum is preferable, as it is the most nearly transparent to the Roentgen rays. Dr. Kells was prepared with a subject and an aluminum and rubber combination plate-holder to demonstrate his method of taking these skiagraphs, but there was no current available in the daytime, and at night the interest was so great in the fluoroscopic demonstration (showing the bones of the hands, forearms, etc., of all who desired to see this portion of their own anatomy) that it was impossible, owing to the crowded room, to take the skiagraph. He, however, presented skiagraphs, taken in from five to fifteen minutes, showing the perfect outlines of the roots of the teeth in the bone, taken from living subjects.

THIRD DAY—*Morning Session.*

The report of the Committee on Consolidation was again read, and on request of the chairman of the committee was, on motion, referred back to the committee for amendment.

The amended report was then read in substance as follows: "*Resolved*, That it will be agreeable to the Southern Dental Association to have the American meet at same time and place as the Southern, that a conference might be had."

On motion of Dr. Clifton, the report as amended was received.

Dr. FRIEDRICHS moved to lay the whole subject on the table.

A vote being taken, apparently in the negative, a division was called for, a rising vote resulting in a tie.

Dr. W. H. RICHARDS. It is important that in this matter we treat the American Association with all due courtesy. This question should be more fully discussed, that the sentiment of all may be fully understood.

The CHAIR. I agree with the last speaker. We are not discussing the question of consolidation. No such proposition has been made, but simply that there be had a meeting of the joint committees to discuss that question. The Chair decides on the tie, that the vote to lay on the table is lost.

Dr. H. E. **Beach.** Our committee has offered a minority report, no joint conference of the committees having been had since our last annual meeting in Atlanta, except conference through correspondence. I therefore offer the following resolution :

> "Moved that this, the report of the committee, be recommended, and that they be requested to hold a conference with the committee from the American Dental Association and report back to this association at their next annual meeting."

After a general discussion of the resolution of Dr. Beach, it was put to a vote and carried.

(To be continued.)

AMERICAN DENTAL ASSOCIATION.

(Concluded from page 950.)

SECOND DAY—*Evening Session* (Continued).

Dr. H. L. **Ambler**, Cleveland, O., read a paper entitled "Nodule on Apex of Root," as follows :

A lady aged about thirty presented for treatment of a chronic abscess of the right superior lateral incisor ; upon examination with a probe, it was found that the labial wall of bone, at the apex of the root, had been destroyed. With the intention of scraping the apex and breaking up the sac, a small right-angled scoop was introduced ; it passed easily over and around the apex. Upon withdrawing it, a small nodule of dentine or enamel about the size of an ordinary pinhead was brought away. The abscess was treated with pyrozone four times at intervals of three days, when the discharge ceased. Evidently the pulp had been dead for a long time, and the canal filled, as there were large mesial and distal fillings. The case was lost sight of for a year, and in the mean time she had this lateral, and also the right central, which was badly carious, extracted, and is now wearing an artificial denture.

The special interest attached to the case is the fact of finding a nodule at the *apex* of the *root*, especially of a *single-rooted* tooth.

Enamel-nodules are small excrescences, apparently consisting of enamel, occasionally met with upon the roots of teeth. They are generally found upon multiple-rooted teeth, situated a little below the neck and often at the junction of two roots. On section they are found to consist of a cone of dentine covered with a rather thick layer of enamel, and often connected to the crown with enamel.

Wedl says that these nodules are the result of localized continuations of the development of the enamel between the already developed basal portion of the roots, and are produced by a strip of the enamel-organ which has persisted longer than the rest. Smale shows a cut of one of these nodules on the apex of a *molar* root, and says they may be accounted for by a budding from the tissues concerned in the process of the formation of the tooth. Tomes shows a cut of a nodule situated on the *neck* of a *single-rooted* superior cuspid.

Dr. W. N. **Morrison**, St. Louis, Mo., had found nothing in any of the Section reports on planting teeth, and he did not like to allow the subject to go by default. He therefore wished to report continued progress along this line of practice. He continues to plant teeth with as much confidence as ever, and with as much confidence that in following along that line he is doing as good service as with any other dental operation. In regulating teeth, instead of constructing an apparatus for the entire arch at once, he directs his efforts at one part at a time, on the hint that nature builds one part at a time. He therefore puts the force against one tooth at a time. For instance, in interlocking laterals, he drives one right out to where it ought to be, makes a retaining apparatus to hold it there, and transfers his operations to the tooth on the other side.

Dr. FILLEBROWN had, within the past few weeks, spoken on the subject of his paper to a number of dentists, and he had found none to whom the idea of the connection between the antrum and the frontal sinus was not new. Dr. Cryer did not show conditions like those exhibited here, nor did he say anything about them. In regard to our anatomy, it is true that dentists as a class do not know enough in regard to the subject, and that is the reason why dental colleges should teach anatomy from the bottom to the top. Our men are smart enough ; give them a chance to learn, and they will come out all right. He did not describe his treatment in the paper, because he was talking about anatomy and not treatment. He wished to compliment Dr. Abbott for his remarks with regard to cleanliness. It is true, as he said, that if you can keep the parts clean, the disease will take care of itself.

Dr. W. H. RICHARDS, of Knoxville, Tenn., presented some new experiments relating to the morphology of the pulp, illustrated by lantern slides, as follows :

The morphology of the teeth has, by reason of their accessibility, permitted easy classification of all their natural external peculiarities, and also an index to the diseases which prevail during their formation. Not so, however, with the pulps, for hitherto all efforts at studying their features have been fruitless by reason of their dense bony covering, the delicate, fern-like formation of some of their fibers, and the ease with which pulp-tissue is destroyed.

We have been content to leave the pulp (King of *Nerves?*) to *live* and die within its pearly palace without a knowledge of the ills which beset it, or of a mode of preserving its corpse in its entirety as a study, even at the expense of its castle.

From time immemorial the knowledge of pulps was gained by first *cracking* the teeth and noting the relation of cavity to pulp, etc. ; later investigators sought, by cutting longitudinal and cross sections, to systematize the work by better comparison ; latterly teachers have amplified the above by fastening the teeth so cut to blocks of wood with sealing-wax, from which impressions or silhouettes are printed on paper for ready reference and classification.

These modes of procedure furnish ideas of the pulp along lines which have varied so little, and are so far from presenting a clear conception of the outlines of the pulp, that a better mode of presenting the same will be fully appreciated.

The first steps in any new departure are always beset by many annoyances before perfect results are attained. *No* idea, if it contains a suggestion for advancement, however imperfectly conceived, should be concealed. Therefore, I determined to lay before the profession the line of work I am pursuing *without waiting* until I shall have accomplished *all* that I *see* possible, trusting that by so doing thought will be stimulated in the direction referred to, with the hope that the suggestions may lead to a more comprehensive conception of the physical characteristics of an organ which undergoes many changes from its inception, through its life, to euthanasia with the body, and is more liable, by its malformation, to be mistreated than any other organ.

The idea of divesting the pulp of its tooth, or of digesting the tooth and leaving the pulp, has, no doubt, been the desire of many ever since a closer knowledge of the exterior of the pulp has been demanded.

Filling the pulp-canals *in* the mouth is of common occurrence. To fill them *out* of the mouth, remove the teeth and leave the material which occupied the cavities representing the pulps as they occupied the teeth, gave the suggestion which led to experimenting, thus enabling me to present to you as exact a reproduction of the pulps of teeth as can be procured. The following method, patiently carried out, will accomplish this :

First remove the animal matter from the pulp-chamber of an extracted tooth in any suitable way—preferably by digesting ; occupy the cavity with any substance, under pressure, which will not be affected by acid, alkali, or heat.

Gelatin submitted to formalin forms a horn-like substance which admits of the above treatment ; cataphoric influence greatly facilitates the action, but it should be applied after the chamber has been occupied by the gelatin.

I hope, in the near future, to present a much simpler mode that will place the process in the hands of the dental students, that each may vie with the other in the study, which will involve the comparison of the pulps with the teeth from which they were taken ; will note the influence of temperament, age, and previous condition of servitude ; and, besides, will show variations in the form of the pulp not indicated in the exterior formation of teeth, because said change was brought about subsequent to the exterior formation and superinduced by constitutional disturbance or disease.

We have presumed, because of the well-settled view our present mode of studying has afforded us, that the pulps maintain a form in keeping with the exterior shape of the teeth.

By reference to Plate A, No. 1, you will observe a formation partaking of the form of polypus,—having a peduncle, or neck, and other characteristic peculiarities akin to polypi. Those adjacent thereto have likewise the ovoid exterior, but with larger neck connection. The exterior form of the tooth from which it was taken did not attract attention by a similar bulging. On same plate, Fig. 2, the lingual root of the pulp is bifurcated at the apex, and on the bucco-mesial root there is a branch. Same plate, Fig. 3, bucco-mesial limb bifurcated.

Plate B contains pulps of two bicuspids and one superior molar complete Note the projections, or lateral horns, on the molar pulp at the neck.

Plate A.

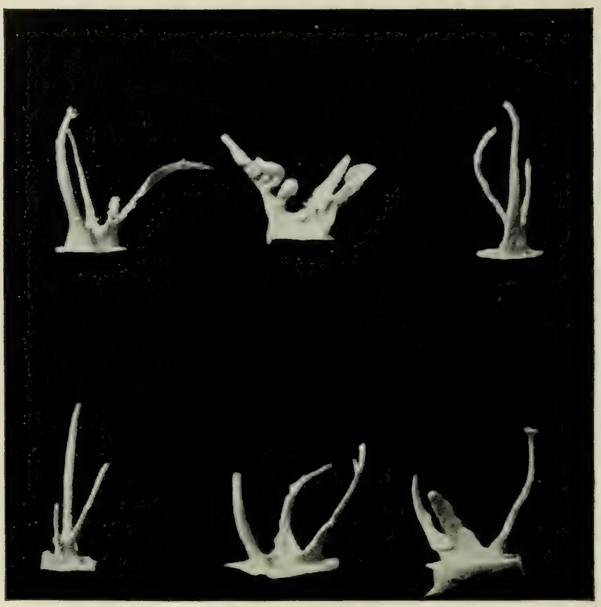


Plate B.

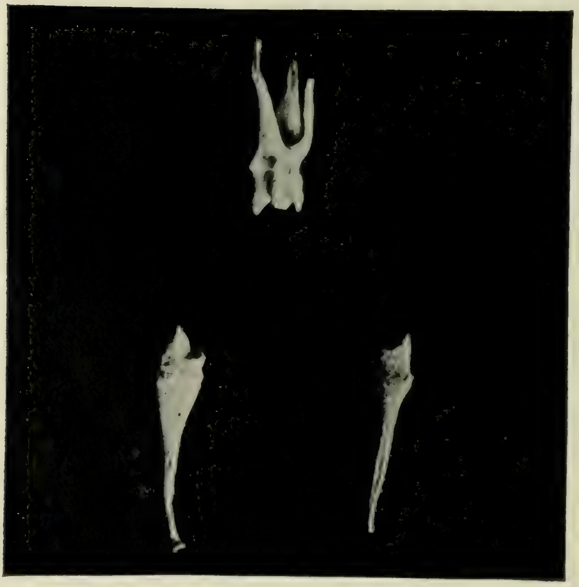


PLATE C.

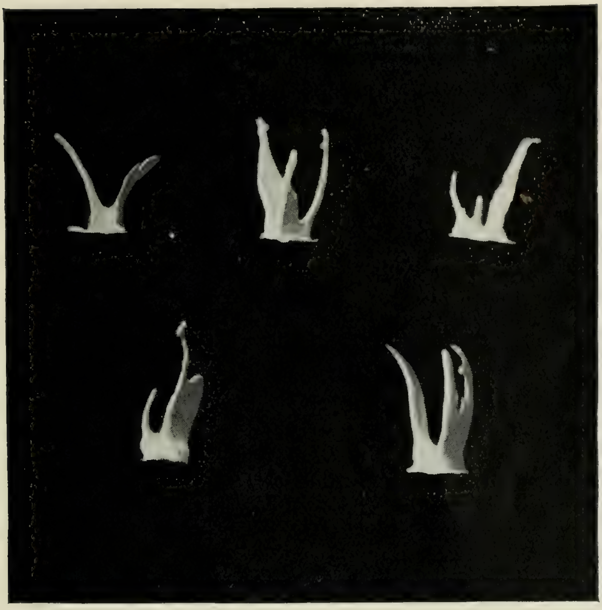


PLATE D.

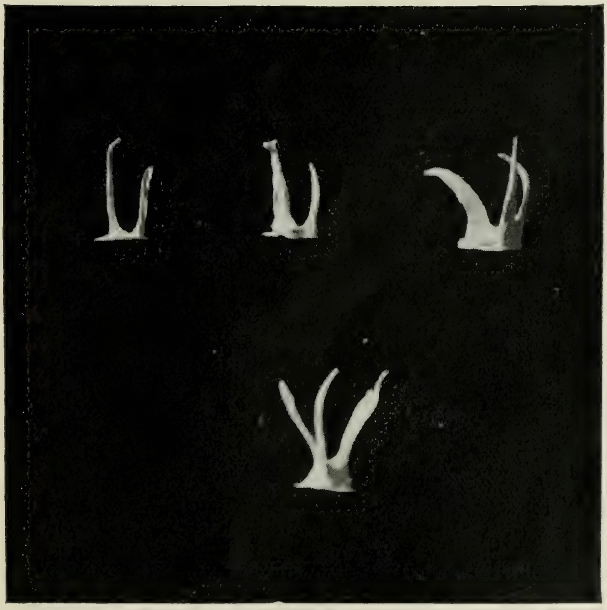


PLATE E.

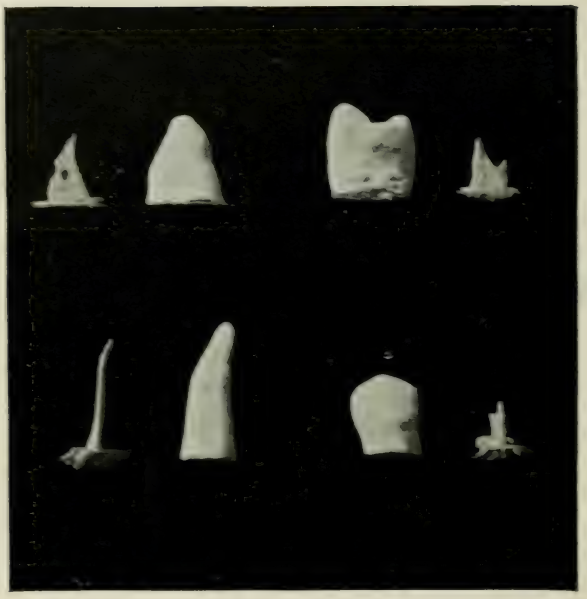


PLATE F.

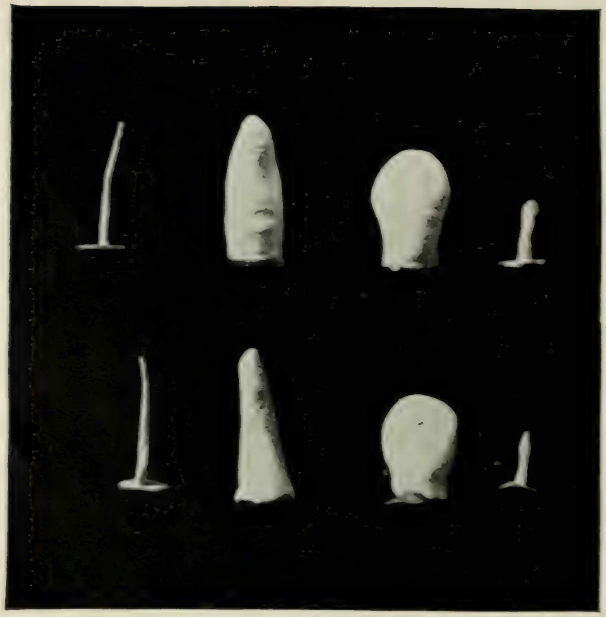


PLATE G.

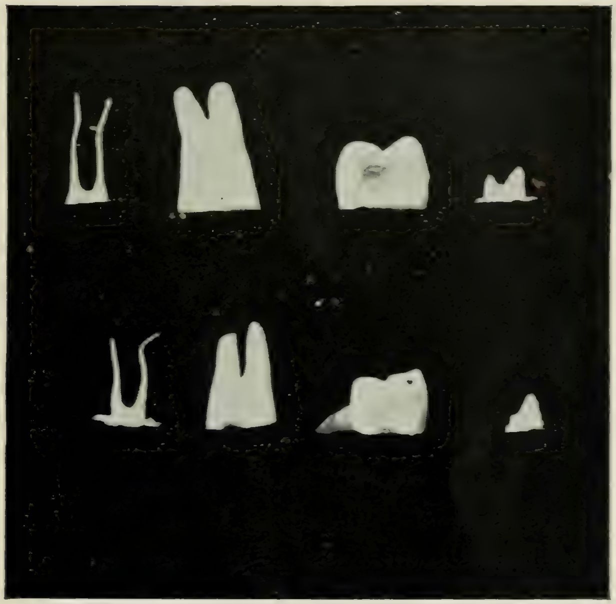


PLATE H.

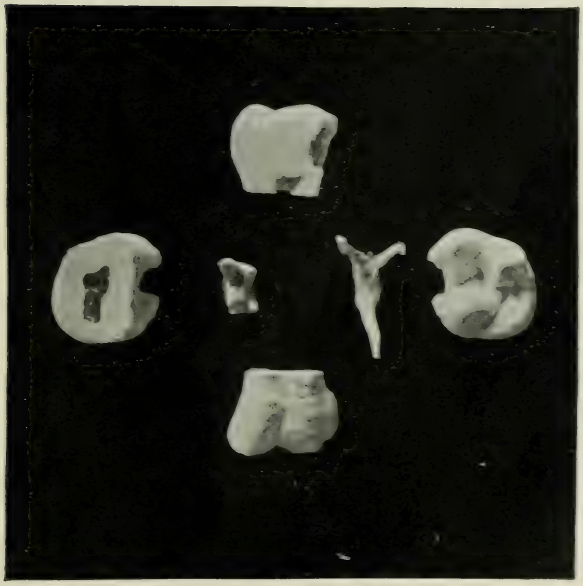


Plate I.

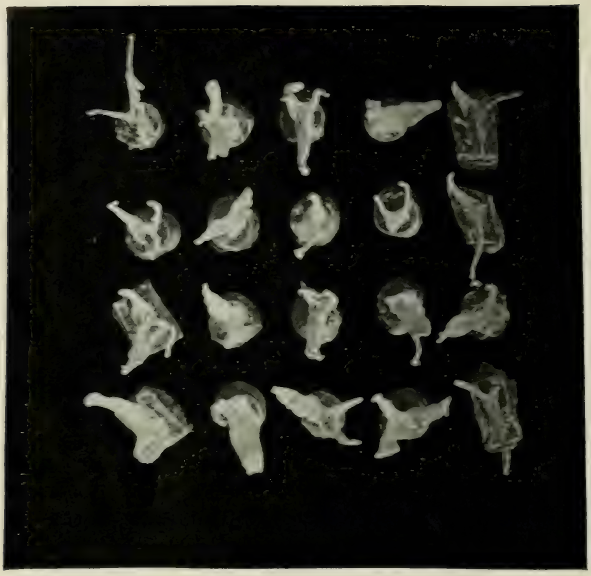


Plate J.

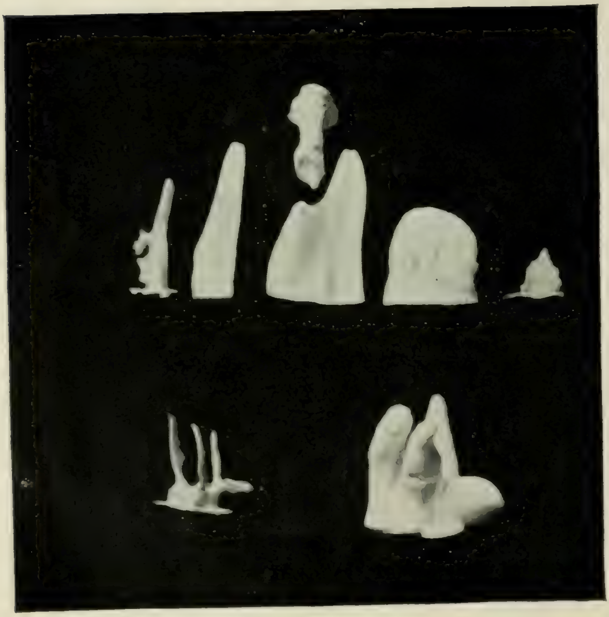


Plate C—lower molar pulps.

Plate D—lower molar pulps.

Plate E shows relative comparison of crown and root of the superior second bicuspids and the pulps.

Plate F—mesial and distal view of superior cuspids, and comparisons of crown and roots with pulps.

Plate G—two superior first bicuspids. No. 1 shows a lateral projection of tissue.

Plate H—relation of pulp to crown, and apical view of pulp-roots.

Plate I—a view of twenty molar pulps from their apices.

Plate J—No. 1, fusion of right superior cuspid with lateral incisor; No. 2, pulp; No. 3, projection of fleshy matter into the root of a tooth in the region of the canal of a lateral incisor which remained in the jaw when the tooth was extracted.

PLATE K.

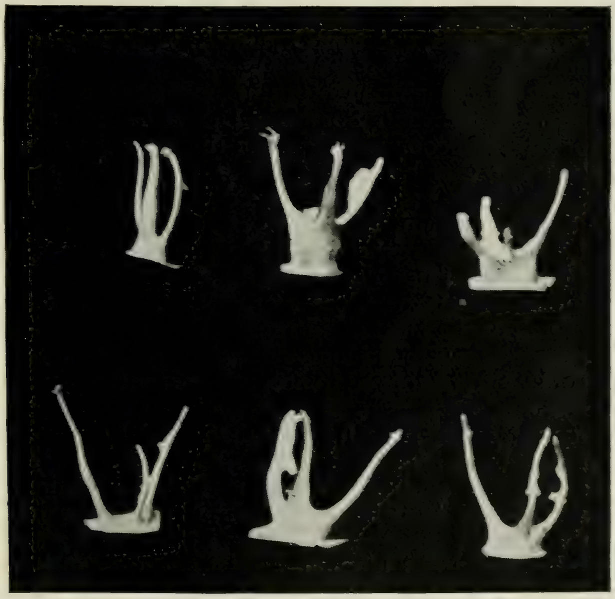


Plate K contains six superior molar pulps. No. 1 is remarkable for the amount of tissue and the number of branches shown at the apices of the lingual and distal roots.

The difficulties attending the complete removal of all the pulp-tissue from a tooth *out* of the mouth through as small an opening as we would *in* the mouth, would lead one to consider, after viewing what a tooth may contain, how far we may err in attempting to fill pulp-canals perfectly, and how *immediate* root-filling should be regarded.

Dr. THOMAS FILLEBROWN, Boston, also showed some lantern slides illustrating the subject of his paper read at the morning session.

Adjourned to meet at 9 o'clock Thursday morning.

THIRD DAY—*Morning Session.*

The association was called to order at 9.30 A.M.; Dr. Crawford, the president, in the chair.

Dr. A. W. HARLAN, Chicago, called attention to the fact that the matter of general addresses had been overlooked at the last meeting, and this feature had consequently been omitted from the program.

Later the Executive Committee recommended the appointment of Drs. A. W. Harlan and J. S. Cassidy to deliver the general addresses next year, the subject of the former to be "Miasms and Infection," and of the latter "The Relation of Chemistry to Dentistry."

Dr. J. N. CROUSE, chairman of the Executive Committee, reported that Dr. E. C. Kirk, the chairman of the Committee on State and Local Societies, had stated to him that he must be relieved from his duties on that committee. In view of the necessity of stimulating the interest of state and local societies in the work of the association, he moved that the chair appoint the committee on State and Local Societies. So ordered. Later the chair appointed Drs. J. N. Crouse, of Chicago, L. P. Bethel, of Kent, O., and A. W. Harlan, of Chicago, as the committee.

Dr. FILLEBROWN, chairman of the committee on the proposed union of the American and Southern Dental Associations, read a report of progress, recommending that this association meet next year at Old Point Comfort, which point had been selected by the Southern Dental Association as its next place of meeting, in order that the matter may be finally settled.

The committee on the revision of the constitution, appointed some years since, was called upon to report, and its chairman, Dr. W. C. BARRETT, of Buffalo, made a brief verbal statement referring to the report submitted at the meeting in 1892. Dr. Barrett had supposed that the matter was moribund long since.

Dr. B. HOLLY SMITH moved to accept the report and continue the committee.

Dr. CROUSE stated that he felt that there had been good reasons why action on this report should be deferred, and that those reasons still existed, one of them being the proposed union of the American and Southern Dental Associations, which, if effected, would present new conditions.

Dr. Smith's motion was adopted.

Section VII was taken up and passed.

Section I was called, and Dr. ALONZO BOICE, secretary, reported that the Section had nothing to present.

Section II, Dental Education, Literature, and Nomenclature, was called, and Dr. LOUIS OTTOFY read the report, of which an abstract follows:

Following its annual custom since 1887, the Section reported the number of dental colleges, with such other data concerning the attendance of students and the number of graduates as was obtainable. The number of colleges in active operation was 46; organized during the past year 2; corporations conferring the dental degree, but concerning which no further information had been obtained, 3; a total of 51. The new schools were the Colorado School of Dental Surgery, Denver, Col., and the Pittsburg Dental College, a department of the Western University of Pennsylvania, Pittsburg, Pa. The number of matriculates at the various schools was 6293, of whom 6013 were reported as in actual attendance; number of graduates 1446.

The report thought it deserving of mention that every college now actively engaged in teaching, or which has been organized during the year, is either a member of the National Association of Dental Faculties, has an application for membership pending, or has announced its intention to apply for membership. This fact is important, inasmuch as the National Association of Dental Faculties has just adopted a plan for preliminary examinations, by which the requirements for admission into all the schools are made identical and graded from year to year, so that, beginning with next year, the educational students will be higher, and will increase within four years to a plane practically equivalent to a high school education. The Section deems this one of the most important advances made in dental education.

In view of the time devoted to dental education and literature last year, the Section had no further report upon them at this time.

A paper was read by Dr. L. P. BETHEL offering a suggestion regarding a feasible method of interesting the public in dental matters, in which the principal idea was to have a series of articles prepared for the public newspapers, describing in plain language the proper methods for taking care of the teeth. The matter was discussed at some length, and was finally voted down for the reason that it would savor too much of the methods of the charlatan, and would be misunderstood by the people for whose benefit it was intended.

Dr. S. H. GUILFORD, Philadelphia, chairman of the Committee on Nomenclature, read the report, of which an abstract follows:

The report stated that, notwithstanding the time spent over the tabulated portion of last year's report, it was not entirely free from inaccuracies as it appeared in the Transactions. Reprints of the report had been sent to various dental societies for discussion and criticism. Only one society had reported the result, the Academy of Stomatology of Philadelphia. A synopsis of the discussion before that society was included in the report.

The committee had decided to adopt the method of indicating the sounds of vowels and syllables used in the "Century Dictionary," as being more exact and simpler than any other.

The committee had thought best to append a list of terms the use of which should be discontinued, as "canine," "wisdom-tooth," "sixth-year molar," "air-chamber," "odontitis," "aluminium," "cast," and others.

The committee also recommended the abandonment of the hybrid "dental technics" and its substitution by the single word derived from pure Greek roots, "odontotechny."

The committee's work was at first undertaken simply to improve our nomenclature for our own benefit, but its sphere has widened somewhat since, and the good results of the labor expended are shown in the fact that medical lexicographers have shown a desire to obtain copies of the first report, with a view to including our list of terms and definitions in their respective dictionaries.

The report closed with an invitation for suggestions and generous criticism.

Dr. Guilford also read a brief note from Dr. A. H. Thompson, of Topeka, Kan., quoting the views of the late Dr. W. O. Kulp and Professor Lester F. Ward on the necessity of a clear nomenclature.

Dr. BARRETT commended the report of the committee; the sole criticism which he would make upon it being that, in his view, it went beyond its field and entered upon the subject of general philology. With that exception, he indorsed it heartily as in the line of advancement.

Dr. TAFT would ask Dr. Barrett how we could study the subject of nomenclature without words.

Dr. BARRETT replied that he never knew Dr. Taft to be without words to express himself. We are supposed to have some knowledge of general literature and general nomenclature, but when we go outside of professional literature we enter the general field of philology, which is altogether too wide for our consideration here.

Dr. T. C. STELLWAGEN, Philadelphia, thought the committee would be more highly complimented if, while accepting their work, we defer adopting their conclusions until we have had time to see them in print. He hoped that in formally accepting the report we should not necessarily indorse all its conclusions.

Dr. GUILFORD. The committee has one intention only, and that is the good of the profession. It will be glad to receive criticisms or suggestions from any who have them to offer. If those who have them will write to any member of the committee, their ideas will have careful consideration.

The Section was passed.

Dr. CROUSE moved a reconsideration of the order of business, and that the time for the election of officers and the selection of the next place of meeting be made five o'clock this afternoon. So ordered.

Dr. Henry W. Morgan was appointed a member of the Committee on Nomenclature.

Dr. TAFT, from the Committee on Necrology, reported that it had been impracticable for the committee to go ahead and formulate the report. He asked the privilege of preparing it and sending it to the secretary at the close of the meeting, which was granted.

Dr. CORYDON PALMER, Warren, Ohio, to whom time had been granted, presented a number of inventions to the association and through the association to the profession at large. The first of these was a revision of the instrument for making holes in the rubber-dam in the mouth after the dam has been adjusted on the other teeth. The instrument has a curve in the joint, so that in using it the operator is enabled to see just what he is doing. He also passed around three sizes of punches for the rubber-dam. He also presented an instrument for handling wedges between the teeth and for pulling them out, and which could also be used to take off a ligature. He advised the use of wood for wedges, and claimed that wedges of the finest quality of Turkish boxwood were superior to any others.

Dr. Palmer also exhibited his wedge-cutter, which was made on a curve, with which he claimed that any portion of the mouth could be reached with the ability to see what is being done.

The thanks of the association were extended to Dr. Palmer.

Adjourned until five o'clock.

Afternoon Session.

The special order was the selection of the place of meeting and the election of officers, which has already been reported.

After the usual votes of thanks the newly-elected officers were installed, and the association adjourned to meet at Old Point Comfort, Va., the first Tuesday in August, 1897.

Our report in the November DENTAL COSMOS of the discussion on Dr. Barrett's paper, "The Orbicularis Oris," before the American Dental Association, was defective in that in condensing an important statement made by Dr. Corydon Palmer was omitted. In speaking of the "finishing molar," Dr. Palmer said that he made the first of these ever mounted on a plate, and that he suggested to Dr. White the idea of placing this form on the market, supplying the models with which their manufacture was inaugurated.

ANNUAL CONVENTION OF THE SIXTH, SEVENTH, AND EIGHTH DISTRICT DENTAL SOCIETIES OF THE STATE OF NEW YORK.

THE twenty-eighth union convention of the above-named societies was held in the New Osborn House, Rochester, N. Y., October 27, 1896, continuing three days; Dr. B. S. Hert, of Rochester, president of the Seventh District Society, presiding.

FIRST DAY—*Afternoon Session.*

The president read a short address, welcoming the convention to Rochester, and predicting an interesting and useful session; after which Dr. PERCY D. GREENE, of Belmont, N. Y., read a paper entitled "Salivary Calculus," in which the essayist gave a general account of the composition of the deposits, their usual location upon the teeth, and the grounds for belief in their salivary origin. The modification in composition and physical characteristics of the several kinds of salivary tartar from the action of the different salivary and mucous secretions as factors in the formation of the deposits were alluded to. The injurious effects of the deposits upon the vitality of the pericementum were noted, and the importance of especial care in the thorough removal of tartar was emphasized. Patients are becoming more thoroughly educated as to the importance of thorough cleansing of the teeth by the dentist, and the essayist felt that the dental profession was not above criticism in regard to the frequent failure to give practical attention to this matter. Many otherwise careful operators neglect to thoroughly remove all deposits from the teeth of their patients, either because of the unpleasant character of the operation or because of the lack of adequate compensation.

One difficulty experienced by the essayist was the lack of suitable instruments, especially one that would freely reach the end of the root of the tooth, particularly the roots of the lower incisors. A bayonet-shaped instrument had been suggested for the purpose, and the suggestion seemed to be a good one.

The essayist advocated the radical and thorough removal of all deposits, and the thorough use of the brush, not only upon the teeth but upon the gums.

Discussion.

Dr. R. H. Hofheinz thought that the necessity for the careful removal of all tartar from the teeth was too frequently overlooked, even by those who were otherwise generally careful in their practice. Personally he thought it was as much to a dentist's discredit to neglect this point as to be careless in finishing a filling properly. Much difference of opinion exists about the reason of the deposit of tartar. Dr. Burchard holds that the calcium salts held in solution in the saliva are precipitated in a coagulum of mucin because of the acidity of the fluids of the mouth, due to fermentative processes. Another theory is that the calcium salts are held in suspension in the saliva, and so are deposited. The most widespread theory, and that held by Dr. Miller, is that the calcium carbonate is held in solution in the blood by carbonic acid, and when this escapes in the mouth is precipitated, and so forms the tartar.

Dr. F. W. Low had nothing new to offer as to the theory of tartar, but wished to express his opinion of the necessity of its careful removal. He did not think a dentist who did his duty honestly to his patient would or could neglect it.

Dr. W. W. Coon, of Alfred Center, said he had not been able to find exactly the instrument needed to remove the tartar from the roots of the teeth. He thought a bayonet-shaped instrument, with a blade long enough to reach to the end and fine enough to avoid wounding the tissue unnecessarily, should be used, but there was no such made by the dental instrument makers.

Dr. Low said it was sometimes very difficult to reach all the deposit, but he always managed to get to it somehow.

Dr. Arnold thought that generally dentists who were careful in their operations were also careful to remove tartar from the teeth, but that in many mouths it would return, sometimes within a week or two. It is a serious question what can be done to hinder this return. If patients are advised to use pumice-stone to keep the teeth clean, there is a possibility of their wearing off the enamel and rendering the teeth very sensitive ; or if this does not take place, patients, as a rule, soon tire of any unusual effort to keep the teeth in order, and let them take their chances. He had advised his patients to use phénol sodique and water, to be applied by the aid of orange-wood, and found it useful, especially in cases where it was deposited on the lingual surface of the inferior incisors.

Dr. W. C. Wilbur, of Corning, said a thin, straight instrument, with square corners, was effective to remove the deposits.

Dr. A. Osgood, of Bath, thought the instruments generally used were too coarse. They should be finer, so they could get to where they were needed.

Dr. F. A. Greene, of Geneva, found that a stream of compressed air, with a pressure of from fifteen to twenty pounds to the square inch, introduced into the pocket containing the deposit of tartar, served an excellent purpose, keeping the cavity dry and clean, and forcing the soft parts out of the way. It is introduced through a very fine tube, and keeps the parts in such condition that the tartar can easily be felt with the appropriate instrument and removed.

Subject passed.

Dr. V. H. JACKSON, of New York, explained his method of correcting irregularities. He said to get the best results each case must receive careful study, and the study of each operation will enable the operator better to overcome those which succeed it. Dr. Jackson explained his methods by the use of about one hundred casts of cases, with the apparatus used, and numerous drawings on the blackboard. He said that he had had cuts made of many of his models, and these he had copyrighted. He was willing that all should use his method, and would give full explanations of every case, but reserved the right of publication. The remainder of the session was spent in listening to Dr. Jackson's description of the cases and history of his operations.

Evening Session.

The convention was called to order at 8 P.M., and Dr. W. C. BARRETT, of Buffalo, gave a lecture on Dental Caries, using the stereopticon to illustrate the subject. He said that the knowledge of what bacteria are, and their pathological action on organized bodies, was of very modern date. Formerly they were supposed to be of animal nature, but now they are known to be vegetable growths, as truly vegetable as cabbage and beets. Their function is to tear down the tissues upon which they grow. They dissolve organic matter into its elements, which are thus set free to combine again into other forms of organisms. The very elements of which my body consists have already been part of other organisms, vegetable and animal, even perhaps other human organisms.

Every vegetable builds up its own organization at the expense ot that on which it grows ; so with these minute vegetable growths called bacteria. Some, it is true, do not grow on organized matter, but those which do are our subject at this time.

The old subject of the cause of dental caries has been threshed over and over again for years. Formerly it was supposed to be an acid. As good an authority as Dr. Watt thought it was an acid, and so far he was right ; but he was wrong in thinking it an inorganic acid. Later investigators, and especially Dr. Miller, have proved it is an acid product of the action of bacteria on the tissues.

Among the slides shown by Dr. Barrett were several showing the minute organization of the healthy tooth-substance, followed by others showing dentine invaded by bacteria and broken down by caries. He also showed one slide, a section from a tooth in which Dr. Miller had produced dental caries artificially and out of the mouth. This was true caries, not distinguishable by any test from natural caries.

In conclusion, Dr. Barrett said : It seems the plainest and simplest thing in the world to comprehend the causes of dental caries by the light Dr. Miller has thrown upon it. When there is a place where the food will lodge in contact with the tooth, where the fluids of the mouth cannot wash it away, there the progress of caries will be found. The only way to prevent it is to keep the mouth clean. It cannot be thoroughly sterilized, but much can be done toward keeping it in good condition. Listerine is a good prophylactic against dental caries. The use of this, with cleanliness, which is said to be next to godliness, will be our only effective means for escaping dental caries.

Discussion.

Dr. S. B. PALMER, of Syracuse, congratulated those present upon the opportunity they had enjoyed of hearing Dr. Barrett's lecture and seeing the beautiful exhibition of lantern slides illustrating the subject.

Dr. HOFHEINZ, of Rochester, said it was possible some member would like to know more about the way the artificial dental caries had been produced. He said that Dr. Miller cut up a number of teeth that were perfectly sound, and placed them in a mixture of saliva and bread. This mixture was kept for three months at a temperature of about ninety-five degrees, and during this time frequently renewed. At the end of this period the decay appeared, and was so nearly identical with natural decay that, examined with the naked eye or with the microscope, no difference could be seen.

The subject was passed, and the convention adjourned to meet for clinics at 9 o'clock in the morning.

SECOND DAY.

The morning session was given up to the clinics, which attracted the close attention of those present. Dr. M. W. HOLLINGSWORTH, of Philadelphia, and Dr. L. E. CUSTER, of Dayton, O., demonstrated the obtunding of sensitive dentine by the use of cataphoresis. Dr. A. P. BURKHART, of Dansville, N. Y., filled a tooth with tin and gold. Dr. W. M. SHARP, of Binghamton, showed a gas porcelain furnace, and gave a general talk on porcelain work. Dr. H. C. MCBRAIR baked a continuous-gum case and a porcelain bridge, using the McBrair electric furnace. Dr. JAS. H. BEEBEE demonstrated the use of Darby's cohesive tin. Dr. W. L. MASON showed the manner of using Mason's detachable teeth for crown- and bridge-work and other operations, showing methods which were new and improved.

The afternoon session was called to order at 2.30, and Dr. F. W. LOW read a paper on "Cataphoresis," of which an abstract follows :

The essayist drew attention to the general interest which the importance of cataphoresis had aroused among dentists. The problem of the successful use of this principle was by no means a simple one.

"If every human body presented the same resistance to a given definite quantity of measurable electric energy, the problem would be a simple one ; but therein lies the difficulty. The variance of individuality is supposed to cover an arc of over five hundred ohms."*

He, therefore, who would undertake the successful administration of cataphoric medication should be familiar, at least in a measure, with some of the fundamental principles and laws governing general electric phenomena.

The essayist then gave a lucid and detailed account of each of the three principal units of electrical measurement, which he summarized as follows :

---

* "Depending on the character of the individual's skin-tissue and upon the area of surface covered by the electrodes."—The Practical Application of Electricity in Medicine and Surgery—Liebig and Rohé.

A current of sufficient intensity to drive one ampere of volume through one ohm of resistance is one volt. That current which one volt of electricity will force through one ohm of resistance is one ampere.

That resistance which requires one volt of electricity to force one ampere through is one ohm.

It is plainly to be seen that these three laws are really one, "Ohm's Law," and from it we deduce the following equation :

$$\text{Current} = \frac{\text{electro-motor force}}{\text{resistance}} \left(C = \frac{E}{R}\right).$$

The relation of this equation to the phenomena of cataphoresis is significant.

The solution of cocain hydrochlorid was used for the purpose of obtunding sensitive dentine as soon as the alkaloid was discovered.

The result was practically nil.

Why, then, do we accomplish such wonderful results the instant a current of such infinitesimal proportions is conducted through the body, one link in the chain of the circuit being a solution retained in the cavity of a tooth of this very same cocain hydrochlorid ? In this connection, concerning the employment of apparatus other than that which I use, I do not presume to speak, although I believe the phenomena to be identical, since it must matter not by what combination of voltage and resistance the end is reached.

It is current that does the work.

But how ? is the all-important question.

My answer is, By *electrolysis.*

But, you say, we have been warned against the employment of sufficient current to produce electrolysis.

This does not change the phenomenon.

It is electrolysis.

This fact you soon shall see is easy of demonstration.

Measured in milliamperes and decimals thereof, a current of electricity (in which the presence of cocain does not enter the equation) can be passed through the human body, the amperage being gradually increased from nothing ; at length the current becomes so strong that electrolysis of the tissues of the body itself takes place, and molecules of living tissue are decomposed and split up into their inorganic elements.

This phenomenon manifests itself on the dermis, or immediately under it, at the spots where the electrodes are placed ; resulting, under the positive electrode, in the skin being dried and baked, while at the negative, numerous small blisters rise just under it.

It follows, therefore, that if the energy of the current be all employed in the electrolysis *of the medicament in the tooth*, no harm to the patient comes.

If more than sufficient current for this phenomenon alone should be turned on, the worst that can happen is slight pain in the tooth at the positive electrode, accompanied with rapid drying out of the solution in the cotton or slight blistering of the skin under the negative electrode.

Sometimes one, sometimes the other, sometimes both these complications are manifest ; in my experience blistering occurs most often.

Regarding the disputed question of electrolysis *vs.* cataphoresis,—speaking upon the subject of topical medication,—Dr. Morton says,* "There is little reason to doubt that one action is as distinctive a property of the continuous current as the other." In this statement I deem the eminent physician to be in error.

I am aware that I subject myself to just criticism as being overbold to dispute so competent an authority, but it is my opinion that in no lesser degree is cataphoresis the result of electrolysis than is electrolysis the result of current.

A current led by a good conductor into a solution containing a decomposable organic or inorganic salt, and led out again by a similar good conductor at some distance from the first one, and making a portion of the liquid a part of the circuit, will set up a difference of potential between the two conductors in the solution ; the difference of potential being sufficient, however slight it may be, to overcome the chemical affinities of the molecules of the dissolved salt.

Now, the only phenomenon remaining to be accounted for is that of the movement of the liquid media and the fact that near the bottom of the containing vessel it is observed to be in motion from anode toward cathode, while near the surface the current is reversed.

That this phenomenon should be concomitant is accounted for because of the law of gravity. The alkaloid molecules of the disrupted chemical compound, being of greater specific gravity, naturally settle, while the acid molecules float readily at the top.

In their journey toward the pole of their affinity, as any moving body drags after it some liquid in its going if immersed, so is the perceptible rotary current of the media accounted for. To name *this* cataphoresis is of course permissible, though to my notion this "rose by any other name would sound as sweet."

Now, if one ampere of current will deposit sixty-six grains of metal in one hour, it follows just as inevitably that one-millionth of an ampere will deposit sixty-six-millionths of a grain as it does that a million amperes will deposit half a ton.

Can you imagine any point where this phenomenon ceases to be electrolysis and becomes cataphoresis?

One attribute of electrolytic phenomena which has never to my knowledge been commented on as bearing any relation to cataphoric treatment is that when by electrolysis any alkaloid is disassociated from its salt, at the instant of liberation it is in a state of infinite divisibility. This facilitates most ready penetration of the cocain alkaloid into dentinal tubuli, and accounts for the almost instantaneous cessation of the pain which the initial action of the current causes.

Such authorities as I have been privileged to consult bearing upon the subject of cataphoric medication estimate the resistance of the human body from nine to fifteen hundred ohms.

While this probably is a fair estimate, when the electrodes are made to cover a considerable area or surface of the skin and are kept well moistened, I find that as applied in our usual practice the resistance is very much higher,* varying from 4500 to 24,500 ohms.

---

* DENTAL COSMOS, vol. xxxvii, page 484.

Concerning the subject of bleaching by electrolysis, my studies are as yet very incomplete. I hope to be able to report upon the use of substances that, without eliminating so large quantities of hydrochloric acid, will prove quite as effective as pyrozone in saline solutions.

After reading his paper, Dr. Low exhibited the result of a number of experiments in passing the cataphoric current through pads of litmus paper moistened with different medicaments likely to be used in conjunction with cataphoresis. The solutions experimented upon were guaiacocain, aconite and iodin, cocain hydrochlorid, salt water, silver nitrate, compound tincture of potassium and iodin, aconite tincture, pyrozone (five per cent. solution), and zinc chlorid. In every case the action of the solutions on the litmus paper was more marked upon the end connected with the negative pole.

Discussion.

Dr. L. E. Custer, of Dayton, Ohio, said the process of cataphoresis is both electrolysis and the projecting into the dentinal tubules of the drug used. It is electrolytic, as has been proved, but it also acts by causing the cocain to be brought in an infinitely divided state into contact with the sensitive nerve-fibers. The electrolytic consumption of the cocain makes it necessary to renew the moistening of the tooth during the treatment. It has been suggested that the solution should be acidulated, but this is not necessary. The current must of course be constant, with a very gradual increase of the voltage ; the moment there is a decrease the patient will feel it. There must be no break in the current if it is to be painless. Another point is that the enamel of the teeth is practically a complete insulator, the substance contained in the tubules of the dentine is the conductor of the electricity, therefore every part of the dentine you wish to anesthetize must be laid bare by removing the enamel at the beginning of the operation, except where the process is carried so far as to anesthetize the pulp and so carry the anesthesia back through the tubules.

There are three factors which must be observed to gain success,—the voltage, the length of time, and the resistance of the dentine. The anode must be held perfectly quiet and the negative pole should be applied to the cheek, as the nearer it is, the less resistance is offered, and consequently the less voltage is needed ; and the less voltage used, the less the variation will be and less likelihood of pain. There is no operation we conduct in chemistry that requires more knowledge, observation, and care than does cataphoresis.

Dr. Low said that by the cataphoric use of iodin in cases of acute pericementitis the inflammation can be reduced very remarkably in a very short time. One use that cataphoresis is put to by some dentists is to obtund and remove the pulp. This he thought not advisable, as there will always be considerable hemorrhage. The better way is to expose the pulp under the application of cataphoresis and apply arsenic.

---

* Measured by wire-bridge and telephone detector, the resistance between hand and hand—palmar surface—of several of my confrères in the city of Buffalo proved as follows : Dr. L. Weisberger 8100 ohms, Dr. G. B. Scott 4500, Dr. S. Eschleman 18,900, Dr. C. B. Stainton 24,500, Dr. C. R. Robinson 10,000.

Dr. HOFHEINZ reported that in the clinic he had performed an operation with Dr. Van Woert's apparatus. The patient was a child for whom no dental work had previously been done, and who was extremely sensitive. Several cavities were found, and the dentine was exceedingly painful. The application of a saturated solution of cocain at a high voltage was made for twelve minutes, when it was found that there was absolutely no sensitiveness in the tooth. After excavating the cavity, we applied cataphoresis again for the purpose of extirpating the pulp. This time the application was continued twenty minutes, but the pulp could not be removed on account of the pain caused.

The second patient had a carious second bicuspid very sensitive; after the cataphoresis had been applied for twenty minutes, the cavity was excavated absolutely without pain.

There is no question before the dental profession at this moment which is receiving as much study as this of cataphoresis. Its usefulness has been demonstrated beyond question. There is a difference of opinion as to the mode of action of the drug applied in this way, some considering that the anesthetic effect is due to the action of the drug, others that it is produced by the electrolytic action of the current on the drug, resolving it into its elements.

Dr. L. E. CUSTER said that it was well established that the anesthetic action was not produced, except with a solution of a local anesthetic; therefore, it was due to the action of the drug and not to the electrolytic action of the current.

Subject passed.

(To be continued.)

MICHIGAN STATE DENTAL SOCIETY.

THE officers of the Michigan State Dental Society for 1896–97 are: A. W. Diack, Detroit, president; E. T. Loeffler, Saginaw, first vice-president; H. T. Harvey, Battle Creek, second vice-president; Henry C. Raymond, Detroit, secretary; G. H. Mosher, Jackson, treasurer.

The society will meet in 1897 at Battle Creek.

HENRY C. RAYMOND, *Secretary.*

PENNSYLVANIA ASSOCIATION OF DENTAL SURGEONS.

AT the annual meeting of the Pennsylvania Association of Dental Surgeons held on the evening of October 13, 1896, the following officers were elected to serve for the ensuing year: Naaman H. Keyser, president; Rupert G. Beale, vice president; Theodore F. Chupein, recording secretary; William H. Trueman, treasurer.

DENTAL SOCIETY ANNOUNCEMENTS.

NEW YORK ODONTOLOGICAL SOCIETY.

THE thirtieth anniversary of the New York Odontological Society will be celebrated January 12, 1897, by an afternoon and evening session. A paper will be read by J. Leon Williams, D.D.S., L.D.S., F.R.M.S., of London, England, upon the subject "A Contribution to the Study of Pathology of Enamel." Following is a synopsis of Dr. Williams's paper:

An examination of the microscopic structure of the enamel of human teeth with reference to predisposing causes of caries.

Striation, stratification, granulation, and pigmentation of enamel.

Amorphous enamel. The structure of so-called "white spots" in enamel.

The presence of canals and organic matter in enamel.

An examination of the enamel of the teeth of various animals, especially those which stand next to man in the order of evolution, with reference to the above-mentioned defects of structure.

A study of caries of enamel from its first inception through all the stages of decay to the complete dissolution of the tissue.

The micro-organisms of enamel decay. Illustrated by more than one hundred lantern slides from photographs by the author.

WEST VIRGINIA STATE DENTAL SOCIETY.

THE fifth annual meeting of the West Virginia State Dental Society will be held at Charleston on the third Wednesday in January, 1897. Professor J. Taft, of the University of Michigan, will deliver an address. Members of the society and the profession in general are cordially invited to attend.

CHARLES H. BARTLETT, *President.*
JOHN W. STORER, *Secretary.*

EDITORIAL.

DR. BLACK'S RESEARCHES.

THIS journal has frequently directed attention to what seems to be a misunderstanding of the meaning and relationship of the terms practical and scientific, and has endeavored to show that what is scientific, in the true sense of that term, must be necessarily also practical. That a confusion of ideas respecting these terms is prevalent not only in dentistry, but throughout society, and even among those who lay claim to a fair degree of culture, will be admitted by any who have given attention to the matter. It is a common occurrence to hear it remarked of this or that line of work or intellectual result that it is very scientific but is not practical. Verdicts of this character are usually uttered by those whose lack of training in scientific methods and consequent understanding of the essential meaning of the term is defective, and who therefore endeavor to compensate for this deficiency of special culture by the development and application of what they term practical methods for achieving practical results.

We have endeavored to promulgate the idea that science is an orderly presentation of facts, a systematic arrangement and setting forth of what is true, an exposition of the sequence of cause and effect in natural phenomena. In so far as the common knowledge of the so-called practical man is set in order and sifted from error, it becomes science. Common knowledge differs from scientific knowledge only to the extent that the former may include error. In so far as scientific knowledge is free from error is it practical knowledge. Probably it is the recognition of the fact that much so-called science is not science at all, simply for the reason that it includes errors of observation or of fact, that gives rise to the criticism that science is impractical. Such criticism would be practical were it directed toward the error, not toward the truth of science. Nothing is more practical than truth, and science must be true or it is not science: therefore nothing is more practical than science.

It is not a condition of science nor of its practicality that its truths shall be immediately applicable to the needs of humanity. Many scientific facts are discovered and remain dormant for long periods until some other link in the chain of events gives a new significance and value to the observation, and the fact becomes of immediate utility. Thus the power of cocain to produce a sensation of numbness when applied to the tongue was known and recorded many years prior to its use as a local anesthetic, and it was not until its effect upon the conjunctiva had been observed that its value as a local anesthetic was established. This lack of immediate applicability of scientific observations is another factor which gives rise to the common criticism of the impractical nature of certain kinds of scientific work. Where the applicability of a scientific observation is immediate the criticism does not arise, for obvious reasons. Both the scientific status of any line of research and its practicality stand or fall as determined by its trueness.

The researches of Dr. Black, as published in this journal for some time past, furnish interesting examples of the points in question. It would be too much to claim for the work of any man in these or any lines that his results are accurate beyond the possibility of error. Dr. Black himself recognizes the importance, nay, the inevitableness of the personal equation in all scientific work. But this is a factor which must be taken into account in all the results of human endeavor, be they scientific or otherwise, with the qualification, however, that the personal equation is a factor which is to be regarded as of less importance in the former than in the latter. Of the two lines of research, the results of which have appeared in these pages, the first one, upon the physical characteristics of tooth-structures, will probably have a less immediate bearing upon methods of dental practice than will the results of his study of amalgam set forth in this issue. The reasons for this are mainly that the results of his investigation of the physical characteristics of tooth-structures lead their author to certain conclusions which run counter to deeply-rooted convictions held by the dental profession in general. Dr. Black's views are the outgrowth of certain precise methods of investigation, and nobody doubts their general accuracy as deduced from his experimental method of research. The contrary opinion, held by those who do not accept his results as final, is not the result of precise methods of research, but the result of clinical observation and instrumentation upon the tooth-structures, by which means and through the tactile and visual senses the impression of the physical characters of these structures has been attained. A reconciliation of these opposing views can only be arrived at by a more general study of the subject by a larger number of observers by different methods. Until this work has been done, the element of error which is the basis of the conflicting views can neither be located nor eliminated. Hence the practical utility of these results is likely to be somewhat remote. Their value as scientific work is, however, not altered by the possibility that some future generation of dentists may be the first to reap a practical benefit from them.

The results of Dr. Black's amalgam research, however, give promise of immediate practical utility.

The history of amalgam, if written out in full, would form a bulky part of the whole history of dentistry. The observations and opinions expressed concerning it are only equaled by the mutability which Dr. Black's researches have shown to be inherent in the material itself.

The work heretofore done toward unraveling this much-tangled subject has been meager in the extreme. Not that much study has not been given to the subject, but that it has lacked direction and co-ordination. The profession has been looking not at two sides of a shield, but at a kaleidoscope ; each has reported his view of the amalgam picture, and the resemblances in the observations have been few in kind and widely removed in time.

Dr. Black has now brought something of order into this chaos of facts. It cannot be claimed that he has solved the whole problem, but he has let in light on the cause of many of the peculiarities of this important material, and furnished us with certain data which serve to explain why it is that such contrary opinions are held with respect to its utility as a tooth-saving material.

If he has done nothing more than to show that there is foundation for the belief that it is, under proper conditions, a suitable material with which to fill teeth, and under other conditions a totally unsuitable material for that purpose, he deserves the gratitude of the dental profession for at least demonstrating that both sides in the amalgam controversy are right. But he has done more than this. He has not only shown that a tight and therefore saving filling may be made with amalgam, but he shows how the material must be prepared in order to accomplish that result. It is not a matter of guess-work, but a problem involving the niceties and precision that are demanded in the preparation of a definite chemical compound ; in fact, the deduction is clearly evident from the data which he presents that these amalgam masses are essentially chemical compounds, and that their most marked irregularities of physical behavior are closely related to the question of the definiteness of the atomic relationship of their constituents.

The question of "flow" of amalgams, a hitherto unsuspected physical property in those compounds, is in itself a most important discovery which has a direct relation to the durability of the filling. The settlement of the differences in working quality and of durability of amalgams due to "ageing" of the alloy, and the discovery—for it is literally a discovery—of the difference which temperature makes in the capacity of the alloy for mercury, throws more light upon the physical and chemical nature of these compounds than has ever been done by any previous investigator of the subject. No one can understandingly read the report of this research without being impressed with the complexity of the problem, the enormous labor which it has entailed, the patience and thoroughness with which it has been carried out, and, above all, the logical scientific accuracy with which the truth, heretofore obscured by the multiplicity of factors presented by the problem, has been sought out and set in order so that it could be understood.

The effect of this research cannot be less than to modify the methods of dental practice with respect to amalgams, and improve their manufacture so that this much criticised material may be used scientifically with a marked improvement in the results of its use.

DENTAL NOMENCLATURE.

In addition to the list given on page 1023 of the current number, the Committee on Nomenclature of the American Dental Association recommend the discontinuance of the following terms : Abnormality, articulation (occlusion), eye-tooth, fang (root), gauge (gage), gum-boil, nerve (pulp), peridentum (pericementum), periosteum (pericementum), temporary (deciduous), prothetic (prosthetic), proximate (proximal), twelfth-year molar.

THE LIST GROWS.

In the September issue of the DENTAL COSMOS, we noted as an interesting feature of the late meeting of the American Dental Association that its sessions were attended by "four men who had been in honorable and honored practice for a full half-century or more." It appears that there was still another whose name should have been included: Dr. Henry J. McKellops, of St. Louis, entered upon the practice of dentistry in 1844, and, happily for his patients and his colleagues, is still in the harness. We make the *amende honorable* with pleasure.

◆

BIBLIOGRAPHICAL.

PRACTICAL DENTAL METALLURGY. A Text and Reference Book for Students and Practitioners of Dentistry, embodying the Principles of Metallurgy and their Application to Dentistry, including an Addendum of Collateral Literature, with Experiments. By JOSEPH DUPUY HODGEN, D.D.S., Assistant to the Chair of Dental Chemistry and Metallurgy, University of California, College of Dentistry; late editor of *Pacific Coast Dentist.* San Francisco, The Hicks-Judd Co., publishers. 1896.

As stated in the preface, this volume is an outgrowth of the exigencies arising in the class-room and laboratory experience of the author as an instructor in dental metallurgy during the past several years.

This statement is well borne out by the character of the book. It is eminently practical in method and well adapted for use not only as a laboratory manual, but as a text-book. The principles of dental metallurgy are clearly set forth and illustrated by well-chosen experiments. The experimental method of instruction is interwoven with the whole work, serving not only to illustrate the principles treated, but, in connection with each department of the subject, a series of typical operations is given which, if practically carried out in a metallurgical course, could not fail to be of the utmost value in training the student in this important branch.

The author clearly recognizes what is, perhaps, universal or nearly so—viz, the reluctance with which the majority of dental students take to the study of chemistry and metallurgy. Dr. Hodgen's book is a presentation of a phase of the subject by a method which, if it were more generally pursued, would do much toward overcoming the reluctance alluded to.

The work is not beyond criticism in some of its details, but where such a mass of matter has to be dealt with, this is to be expected in a first edition. As a whole, it is to be commended both for its method and its matter, which are in the highest degree excellent.

THE X RAY, OR PHOTOGRAPHY OF THE INVISIBLE. By WM. J. MORTON, M.D., in collaboration with EDWIN W. HAMMER. American Technical Book Company, 45 Vesey street, New York. Price, paper, 50 cents.

This little monograph is a timely publication by well-known experts which places before the reader a clear and 'succinct account of how to proceed in making pictures by the Roentgen ray. The subject is treated with considerable breadth, so that the operator is not merely trained in the art of making skiagraphs, but sufficient of the scientific basis of the art is set forth to enable him to proceed with an intelligent understanding of the subject.

The vista of possibilities opened up in the line of physical diagnosis both in dental and general pathology by the discovery of Professor Roentgen, has already attracted many investigators to experimentation with this newly-discovered form of energy. The practical results already obtained are of sufficient importance to warrant a study of the phenomena by all who are concerned with work related to it. The little book of Professor Morton and Mr. Hammer is a most satisfactory guide for all who wish to become familiar with the methods of this attractive field of research.

LA PHOTOMICROGRAPHIE, HISTOLOGIQUE ET BACTERIOLOGIQUE. Par J. CHOQUET, Chirurgien Dentiste, D.E.D.P., de la Faculte de Médicine de Paris, Preparateur a l'École Dentaire de Paris. Paris, Charles Mendel, Editeur, 1897.

This work is a clearly-written treatise upon photo-micrography as far as it is related to the study of histology and of bacteriology. Beginning with the utility of photo-micrography as related to the study of histology and bacteriology, a full exposition of the apparatus and methods required for the prosecution of the work follows. Included in this are descriptions of the several instruments employed, the objectives, oculars, and condensers, the means of illumination, the photographing of colored objects, time of exposure, their development, the final photographic treatment of the negatives and the printing of photo-micrographs. The final chapter is devoted to the subject of lantern projection, and is a most acceptable addition. The work is illustrated with a number of fine specimens of the author's work in this line.

Facing page 40 is a plate showing a low-power photo-micrograph of a vertical section through the crown and root of a tooth wherein the relative positions of enamel, dentine, and cementum are exhibited. At the junction of the enamel-edge with the cementum of the root the picture shows a distinct tendency of the enamel to overlap the cementum. In many of the lower animals the order of relationship of these two structures is distinctly the opposite of this,—*i.e.*, the tendency is for the cementum to overlap, or, as indeed occurs in some cases, the cementum covers the enamel for a considerable distance. The text-books give but meager information upon the nature of the relation of these tissues in the human tooth, and it would be interesting to know just what the rule is concerning it.

The book of Professor Choquet is a valuable addition to our knowledge of the details of this important aid to microscopical research, and to our methods of study and instruction.

MANUEL DU CHIRURGIEN DENTISTE. THÉRAPEUTIQUE DE LA BOUCHE ET DES DENTS. Par le Dr. MAURICE ROY. 1 vol., 286 pages. Price, 3 fr. Paris, J. B. Bailliere et Fils. 1896.

This is a small and conveniently arranged handbook of dental and oral therapeutics and materia medica. The subjects are classified in the order of therapeutic action, medicaments having similar properties being grouped under one head. It is fully up to date as regards its matter, and contains much valuable material in small compass.

The work is published under the direction of Ch. Godon, director of l'École Dentaire de Paris.

PAMPHLETS RECEIVED.

Contribution a l'Etude de l'Implantation des Dents. Par M. Oscar Amoëdo, Professeur à l'École Odontotechnique de France, etc. Résumé des communications faites au Congrès International de Médecine de Rome 1894, et aux Congrès National Dentaire de Bordeaux 1895 et de Nancy 1896. Paris, imprimerie L. Pochy, 1896.

* * *

OBITUARY.

DR. HIRAM N. WADSWORTH.

DIED, in Washington, D. C., October 9, 1896, HIRAM N. WADSWORTH, D.D.S., in the seventy-seventh year of his age.

Hiram Nichols Wadsworth was born in Burlington, Vt., in February, 1819. He was descended from colonial stock, the first representative of the family being William Wadsworth, who landed in Boston in 1632, and who was the father of the noted Captain Joseph Wadsworth, of Charter Oak fame, who seized and secreted the charter of Connecticut when Sir Edwin Andros went to Hartford in 1687 to take it by force from the colonists. Many others of the family have been prominent throughout the history of the country, some having served in the Revolution, and others having been prominent in military, naval, and civil life more recently. Henry Wadsworth Longfellow was of the same ancestry.

The subject of this sketch was one of a family of six children, who were early left to the care of a widowed mother, and it was always a matter of great satisfaction to him in his later years to state that the entire six children had grown to years of maturity, and had done credit to the care and teaching of the mother. In his early manhood he removed to Ohio, and spent some time farming on the Maumee River, where he found ample opportunity to indulge his great fondness for hunting, but otherwise was not suited with his surroundings; so he determined upon a change, and, returning to the East, he commenced the study of dentistry with Dr. Elliott, of Plattsburg, and subsequently attended lectures at the Baltimore College of Dental Surgery, where he graduated with the class of 1853.

Dr. Wadsworth located in Washington City in 1850, where he practiced continuously for over forty years, until ill health obliged him to retire in 1893. During all that long period he occupied a most prominent place in his profession. Few have enjoyed the patronage of such a distinguished clientèle, his patrons being from among the most distinguished circles in civil, military, and diplomatic life; and it was his good fortune to command not merely their confidence and patronage, but to enjoy their respect and esteem as well. He was kind and affable; social, genial, yet dignified; a polished, courteous gentleman, and a splendid example of the true professional man. His motto throughout all his practice was, "The very best which I can possibly do is none too good for my patients."

Though long troubled by defective hearing, he took a deep interest in the welfare and advancement of dentistry, and was instrumental in starting the Washington City Dental Society, one of the first annual addresses ever offered before that body being delivered by him.

For three years he was an invalid, and for nearly the entire time was confined continuously to his bed; but he suffered very little, and was always bright and cheerful.

A widow, who was Miss Mary Frick, of Baltimore, and three daughters, two of whom are married, survive. A. W. S.

DR. IRA A. SALMON.

Died, in Boston, Mass., April 10, 1896, of apoplexy and paralysis, Ira A. Salmon, D.D.S., in the sixty-seventh year of his age.

Dr. Salmon was born at Monterey, Schuyler county, N. Y., February 10, 1830. His parents moved to Knoxville, opposite the city of Corning, where he received a good grammar and high-school education. While a youth he went to New England, and lived in Maine during the first years of his manhood. In 1849 he commenced his dental pupilage with his uncle, Dr. David H. Goodno, and continued it later with Dr. Parsons, of Portland. He entered upon practice in Boston in 1854, in partnership with Dr. Goodno, and they soon acquired an extensive operative and mechanical practice, doing a large business in mechanical work for the profession throughout New England. In 1856 Dr. Goodno went West, and Dr. Salmon assumed the entire practice. He soon, however, formed a partnership with Dr. Samuel F. Ham, who had been his student, and who took charge of the mechanical department. After a short partnership Dr. Ham withdrew, and Dr. Salmon, finding an increasing practice, decided to devote his exclusive attention to operative dentistry as a specialty, and was very successful in difficult cases of dental surgery. He was one of the pioneers in "building down" with gold, many front teeth treated by him in this manner some thirty-five years ago doing service to-day.

Dr. Salmon was a graduate of the Pennsylvania College of Dental Surgery, class of 1867. He was a charter member of the Massachusetts State Dental Society, and was also a member of the American Dental Convention and of the American Dental Association, being corresponding secretary of the latter during the years of 1869, 1870, and 1871. He was a delegate to the Dental Section of the Ninth International Medical Congress, which was held in Washington, D. C., in 1887. On the organization of the Harvard Dental School, Dr. Salmon was chosen University lecturer, and served in that capacity for the first seven years of the school's existence.

In the line of scientific research and invention Dr. Salmon's name became well known. He was the inventor of the Salmon automatic mallet and the Salmon operating chair; of the Salmon system of hot water and steam heating for buildings, steam cars, and street cars, and also of an improvement in autoharp mechanism, etc.

At the age of twenty-one Dr. Salmon was married, at Vassalboro, Me., to Maria W. Chaffee, daughter of a retired Boston builder, and she and two sons survive him. His domestic life was one of love and devotion. He was an ardent Methodist, and worked and wrote with fervor and an intelligent insight for the promotion of a high Christian faith during more than forty years of his life. His remains were taken to Maine for interment.

DR. EDWIN A. STEBBINS.

DIED, at Shelburne Falls, Mass., September 26, 1896, after a protracted illness, DR. EDWIN ALONZO STEBBINS, in the sixtieth year of his age.

Dr. Stebbins was born in Brookline, Vt., July 10, 1837. He was reared on a farm, and educated in the public schools and at a select school at Cambridgeport. He also attended Leland and Gray Seminary at Townshend, and Wesleyan Academy and Female Collegiate Institute at Springfield, Vt., and was professor of penmanship at the latter institution. After some time spent in teaching in the public schools he took up the study of dentistry, and his first dental office was opened at South Londonderry, Vt., in 1860. In 1862 he enlisted in the Eleventh Regiment of Vermont Volunteers, and served until the close of the Rebellion in the capacities of quartermaster-sergeant and first lieutenant. His regiment was at the front at Lee's surrender. After the war Dr. Stebbins opened an office at West Townshend, Vt., and went from there to Shelburne Falls in 1869.

By the death of Dr. Stebbins the dental profession loses an able and prominent man. He was long a member of the Connecticut Valley Dental Society, and for two years its president. He was in almost constant service on its committees, and contributed many valuable papers to it and other societies. He took a great interest not only in dental educational matters, but in the broad field of general education was ever active and progressive. As an operator he was remarkably skillful, especially in crown- and bridge-work. His experiments in the application of the nitrate of silver treatment for the preservation of the deciduous teeth attracted wide attention a few years since. He was a member of the Congregational Church, and an earnest worker in its behalf. His home life was one of sunshine, and as a neighbor and citizen he was highly respected. He was a member of and worker in the Masonic and Sons of Temperance orders. One who knew him well characterized him as a "grand man in all ways,—a man of high ideals, who worked for the good of his profession."

Dr. Stebbins was twice married, his first wife being Miss Jane P. Nutting, of Groton, to whom he was married in May, 1861. His second wife was Miss Adella Smith, of Holyoke, to whom he was married in November, 1878. She survives him with one young son and a daughter.

DR. HENRY AVERY.

Henry Avery, D.D.S., a well-known dentist of Philadelphia, was killed on Saturday, October 31, 1896, by a Reading express train at Oak Lane, near the city, and where he resided. He attempted to cross the track for the purpose of mailing a letter, when he was struck by the engine and hurled some distance and his body terribly mangled.

Dr. Avery was a graduate of the Pennsylvania College of Dental Surgery, class of 1857. He was an accomplished musician, being recognized as one of the finest flute-players in the city. He was one of the original members of the Union League, and stood high in the Masonic fraternity.

◆

PERISCOPE.

Surgical Use of Cocain.—We quote the following practical observations from the *Codex Medicus:*

1. The use of cocain should not be abandoned because its irrational employment has produced deleterious results.
2. Always make a thorough physical examination of the patient before injecting the drug.
3. It should not be used in cases showing organic diseases of the brain, heart, lungs, or kidneys, or in persons of neurotic diathesis.
4. Children bear it fully as well as adults.
5. The patient should always be placed in a recumbent position prior to its employment.
6. Constriction should be used whenever possible to limit the action of the drug to the desired area.
7. Use a freshly prepared solution for each case.
8. Distilled water should always be employed, to which phenic, salicylic, or boric acid should be added.
9. A two per cent. solution has a better effect, and is safer than solutions of greater strength.
10. Never inject a larger quantity than one and one-eighth grains when no constriction is used.
11. About the head, face, and neck one-third of a grain should never be exceeded.
12. When constriction is possible, the dose may be as large as two grains.
13. Every slight physiological effect is not necessarily to be taken as cause for alarm.
14. Cocain does have effect upon inflamed tissues.
15. In case alarming symptoms occur, use amyl nitrite, strychnin, digitalis, ether, or ammonia.

To which we will add: Always use a chemically pure product, free from isatropyl- and cinnamyl-cocain as well as other impurities, the presence or absence of which can be readily ascertained by the simple tests of the U. S. Pharmacopœia.—*American Therapist.*

PUBLISHER'S NOTICE.

CLOSE OF THE VOLUME.

THE principal reason for specially calling the attention of subscribers to the close of the volume is the coincident expiration of the great majority of subscriptions. The DENTAL COSMOS knows no change in its pace or its policy, except as the former may be accelerated by the growth of the profession or as the latter may be laid on yet higher lines through the constant effort to improve. Every volume is worth many times its cost to subscribers, every subscriber's practice is the better for its influence.

The volume just closing has contained many papers which will affect the future of practice. A well-known dental author who makes it his business to digest the contents of all the dental journals stated within a few days that he had found in the current volume of the DENTAL COSMOS eleven articles which each, distinctly and individually, widened the field of dental knowledge,—more than he found in all the others.

Here we have the key to the steady growth of the subscription list of the DENTAL COSMOS, namely, the fact that it is of greater value to the thinking dentist than all other journals combined ; that without it he cannot keep posted in the progress of his profession.

That is why the DENTAL COSMOS has to-day a larger list of *bona-fide*—paid up—subscribers than any other dental journal. This list is not "padded" to attract advertising patronage ; it is the roll of the names of the dentists who value it and its work enough to pay for it,—a roll of honor.

The only way to get the DENTAL COSMOS is to pay for it. It is worth its price ; it stands on its merits as the only purely dental journal, the only one which is absolutely independent. It is *dental* throughout from cover to cover ; its editor is not afraid to speak his mind about any question which interests dentists as such ; it gives the *news* of dentistry.

The DENTAL COSMOS believes it deserves the support of every dentist. It therefore asks for the renewal of expiring subscriptions and for a trial year's subscription by those not now on its list.

Those whose subscriptions expire with this issue will find a bill for next year's volume as a reminder of the expiration.

Volume XXXIX commences January, 1897.

Subscription price to United States, Canada, and Mexico for one year $2.50 ; to other Universal Postal Union countries $3.00 ; half a year half price.

Subscriptions may begin at any time. Back numbers always on hand.

THE S. S. WHITE DENTAL MFG. CO.

HINTS, QUERIES, AND COMMENTS.

To the Editor of the Dental Cosmos:

Sir,—Will you kindly permit me a little space in your esteemed journal for a few words in a somewhat personal affair, which may nevertheless have some general interest?

The last (September) number of the *Quarterly Circular*, published by C. Ash & Sons, in London, and which is also sent to the profession in the United States, contains an *anonymous* "Book Notice" on my "Geschichte der Zahnheilkunde" (History of Dentistry), wherein the writer accuses me of having left out "the name of the world-wide renowned firm" of C. Ash & Sons either by "willful forgetfulness or ignorance."

My words are these (page 220): "In 1825 S. W. Stockton succeeded in manufacturing the first comparatively good-looking mineral teeth, and he probably was the first to make them for trade. The best still unsurpassed teeth were shown by E. Wildman in 1837, and only from this time mineral teeth can successfully contest with the human and ivory teeth used before. *They only came into general use when S. S. White undertook their manufacture.*"

Of course I cannot agree with the writer of the "Notice" as to the importance of the priority of the manufacture of mineral teeth, especially when *none* of the persons in question can claim it; but it appears that my mentioning the name of the *dentist*, Dr. S. S. White, and not that of Mr. Claudius Ash, raised the wrath of some too-warm friend of the FIRM C. Ash & Sons to such a height that an explosion was the necessary result. For how a man in an ordinary temper can say I had claimed the *priority of manufacture* for S. S. White is incomprehensible to me, when all I had to say about this affair is mentioned above.

My history is not very detailed, I am sorry to admit. I had to remember the little interest the profession in Germany shows as to that theme, therefore I was obliged to omit many names of well-earned fame; it would be no very difficult task for me to write another volume of the same size without repeating anything; perhaps I may some day, if my little book meets with success. Of course I may have erred in many instances with my selection, but even the complimentary words of the anonymous writer cannot convince me that I was wrong in preferring to name S. S. White and not Claudius Ash, whose merits I well appreciate in spite of the said article.

Hoping I have not intruded too much upon your valuable time, I remain,

Very respectfully yours,

George Pierce Geist-Jacobi, D.M.D., Zahnarzt.

Frankfurt A.-M., October 26, 1896.

Function of the Upper Third Molar.—As this tooth is the only one of the dental series which presents the typal three basal cones which enter into the construction of the typical upper molar, some explanation is frequently demanded as to why this should be the smallest of the molar teeth, and why the small molar does not approximate the bicuspid teeth. It may be possible that the following explanation has been published before, but I have never seen nor heard it and therefore present it.

It will be noted that the lower jaw is a lever of the third class, the power being placed between the fulcrum and the weight; the fulcrum, the temporo-maxillary articulation; the power, the direct muscles moving the mandible, the masseter, and temporal; the weight is represented by the resistance of substances in process of being incised or crushed between the teeth.

Being a lever of the third class, it follows that, with a given amount of power, the resistance it can overcome is governed by the distance of this resistance from the fulcrum; that is, the molar teeth exert more force upon food masses placed between them than do the incisors. The third molar being nearest the fulcrum, exerts more pressure upon bodies against which it is pressed than any tooth anterior to it. It is therefore by anatomical position designed for the application of great force. Its root or roots being curved backward, instead of being straight, will produce a greater diffusion of force received upon the crown than were the roots straight; this is also true of the lower third molars. The mechanical element in original root formation is, for the present, left out of consideration.

It is seen that in the occlusion of the upper third with the lower third molar, the conical palatal cusp of the upper tooth is in antagonism with the broad occlusal surface of the lower third molar. The lower molar, therefore, is a base upon which a body is to rest which is to be acted upon by a heavy conical antagonist. The usual functions of the teeth, incising and crushing, are clearly not called for, as the structures named are not of fit design for such a purpose. Any one may test, by simple experiment, that the mechanical design described is one fitted best for the breaking, not crushing, of hard, brittle bodies; the firm base, conical tool, and great force all point to this. The articles entering into a dietary which call for these forces are nuts which have hard, resistant shells; *ergo*, the function of the third molars is the crushing of nuts.

It is offered as a suggestive datum to those who are interested in the philosophy of evolution, that the crushing of nuts, or for that matter any hard and brittle foods, is no longer called for in the maxiliary work of the civilized man, and physiological disuse is a corollary. On the other hand, it is not to be forgotten that the buccal cusps of these teeth have their function, which, by the same reasoning, are adapted to the masticating of tough meats and vegetable fiber.—HENRY H. BURCHARD.

CAUTION IN USE OF PYROZONE.—I wish to report what might have been a serious accident caused by the violent explosion of a small sealed glass tube of pyrozone, 25 per cent. solution, ethereal. I was about to break the tip of the tube with small cutting-pliers, having followed directions on package by first chilling in ice-water, when an explosion occurred, the sound of which was as loud as that of a revolver. Many of the fragments of glass were driven to the bone in my face and the hand holding the pliers. The pointed tip of the tube was buried in the flesh near the temple; it would have gone clear through my eye had it varied its direction one inch. Fortunately my eyes were spared, but the blood flowed profusely from a dozen wounds in my face; some of the particles of glass are still imbedded in the flesh, as the wound, though not large, does not heal readily, and bleeds as though freshly cut if it is touched with the towel or hand.

I make this report that others may use greater care and avoid, if possible, an accident which might easily have cost me my eyesight.

I held the tube only partly covered with a wet towel, when it should have been wholly covered.—SIDNEY S. STOWELL, Pittsfield, Mass.

WITHOUT RESECTING THE NERVE.—A case of some interest to me, and perhaps it may be to others, occurred in my practice some time ago, as follows :

Mrs. F. L., a German lady, about forty years of age, called in the month of February, 1894, to have six teeth extracted preparatory to having an upper plate on rubber base inserted. Six months later, in the month of July, she came for her plate. At that time or a few weeks afterward she called again, complaining of a deep-seated pain in the region once occupied by the second molar, and saying it was most unbearable, desiring immediate relief. She stated that the operator before in extracting removed a considerable portion of the bone, viz, the outer alveolar wall covering the three posterior teeth. The parts looked tender and very red, accompanied with slight swelling. I hardly knew what to do, but after probing in all directions and finding no loose bone, decided to cut down for some distance, with the hope that this might relieve the congestion at least, as she had had no sleep for three nights. One-quarter grain acetate morphin was injected hypodermically, and a few powders were given to her to take at home, if need be, to produce sleep. I thought her trouble must be neuralgic and the result of a cold. She obtained temporary relief from this and started for home, some six miles away. I heard no more of the case until January 9, some six months later, when she returned on a very cold day, the "fires within" raging fiercer than ever. This time she was somewhat emaciated and run down, having borne her affliction with great fortitude a long time, and dreading to come. This time a longer incision was made, going deeper, and beginning at the position once occupied by the cuspid and extending back on the alveolar border as far as the third molar, where a cross incision was made which enabled me to raise quite a flap and scrape the remaining tissue, hoping, but hardly expecting, to avoid resecting the posterior dental nerve. I wrote to a physician living near the patient, whom she preferred, asking him to take charge of the case, saying if needed I would go with him and carry it to a final issue. I learned after many months that he never went. Nine months having now elapsed since the last operation, I saw her, when she stated that after one more very light attack she had had no more trouble, and now considered herself perfectly well.—H. C. MANSFIELD, D.D.S., Jefferson, Wis.

ANTISEPTIC DOUCHE FOR ANTRAL CATARRH.—In the treatment of catarrhal conditions of the antrum and naso-pharynx, I have obtained most satisfactory results from the use of euthymol, listerine, or borolyptol diluted with three or four volumes of distilled water and used as an irrigating douche. Each of these preparations is temporarily irritant to the Schneiderian membrane, but the irritation may be controlled by the addition of a minute amount of cocain hydrochlorid to the fluid. The following makes an excellent preparation : Borolyptol, 1 ounce ; distilled water, 3 ounces ; cocain hydrochlorid, 2 grains. The douche should be used at blood temperature. It will frequently abort an attack of acute coryza when used promptly.

It is not intended that this preparation should be used for purulent antral catarrh, for which more active antiseptic treatment is indicated, but for the class of catarrhal conditions which are the result of "taking cold," and which are likely to run a chronic course, characterized by first a dry, heated condition followed by profuse muco-serous discharge and thickening of the membrane.—E. C. KIRK.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

The abbreviations of titles used are those common to bibliographical work, and will, it is presumed, be readily comprehended by any one familiar with dental or scientific publications. Any explanation will be gladly furnished by the compiler. A star (*) indicates a Thesis.

Alexander (C. L.) Cast fillings and bridge abutments. Ohio Dent. J., Toledo, 1896, xvi, 488-491.—**Ambler** (H. L.) Nodule on apex of root. *Ibid:* 487.—**Amoedo** (O.) Seringue hypodermique stérilisable. Odontologie, Par., 1896, 2. s., iii, 512-514. —— Contribution à l'étude de l'implantation des dents. Rev. odont., Par., 1896, xl, 394-409.—**Barrett** (W. C.) The orbicularis oris and the muscles of expression. Dental Cosmos, Phila., 1896, xxxviii, 834-839 —— *Also:* Ohio Dent. J., Toledo, 1896, xvi, 482-487.—**Bates.** The treatment of temporary teeth. Brit. J. Dent. Sc., Lond., 1896, xxxix, 870-874.—**Beadles** (E. P.) The lingual wall. Ohio Dent. J., Toledo, 1896, xvi, 479.—**Boucheron.** De la présence de l'acide urique dans la salive, dans les affections uricemiques de la gorge et de l'oreille. Rev. hebd. de laryngol. [etc.], Par., 1896, xvi, pt. 2, 1201-1204.—**Brouardel** (G.) Glossite syphilitique développée malgré le traitement par les injections du calomel. Ann. de dermat. et syph., Par., 1896, 3. s., vii, 1057.—**Caush** (D. E.) Exostosis. Dental Rec., Lond., 1896, xvi, 441-445.—**Cazeaux.** Des crochets et des moyens de rétention des appareils prothétiques. Odontologie, Par., 1896, 2. s., iii, 539-541.—**Chemists** *vs.* Dentists. Dental Cosmos, Phila., 1896, xxxviii, 865.—**Choquet.** Des dents infectées et de leur traitement. Odontologie, Par., 1896, 2. s., iii, 449-464.—**Curtis** (G. L.) Oral surgery, theory and results. Am. Med.-Surg. Bull., N. Y., 1896, x, 470-474.—**Custer** (L. E.) The Edison current in cataphoresis. Ohio Dent. J., Toledo, 1896, xvi, 465-468.—**Deacon** (A. R.) Children's teeth. Welch's Month., Phila., 1896-7, i, 130.—**De Ford** (W. H.) Soederberg's method for obviating the necessity for removing devitalized tooth-pulps from canals previous to filling. West. Dent. J., Kansas City, 1896, x, 385-401.—**Didsbury** (H.) De la nécessité du traitement des dents de lait. Rev. obst. et gynéc., Par., 1896, xii, 278-281.—**Ducor** (P.) Contribution à l'étude de l'actinomycose en France; actinomycome du maxillaire à forme néoplasique limitée datant de huit ans. Gaz. d. hôp., Par., lxix, 966; 1015; 1030; 1071.—**Eternod** (A.) Essai de théorie de dérivation de la dentition humaine d'un type bicuspidien unique. Odontologie, Par., 1896, 2. s., iii, 509-512.—**Ferguson** (A. H.) Œsophagotomy for the removal of a plate of teeth after performing a thyroidectomy. Am. J. Surg. & Gynæc., Wellston, Mo., 1895-6, viii, 128-130.—**Flagg** (J. F.) Filling of canals and pulp cavities. Items of Interest, N. Y., 1896, xviii, 580-597.—**Flanagan** (A. J.) Dental education of the public. Dental Cosmos, Phila., 1896, xxxviii, 827-829.—**Freeman** (S.) Painless dentistry. Items of Interest, N. Y., 1896, xviii, 568-580.—**Fütterer** (G.) Salivary calculi. Internat. Dent. J., N. Y. & Phila., 1896, xvii, 621-634.—**Garland** (O. H.) Fatal acute poisoning by cocaine. [*From:* Lancet, Lond.] *Ibid:* 683.—**Gaudlitz.** Zur Schleich'schen Lokalanaesthesie. Prakt. Arzt., Wetzlar, 1896, xxxvii, 169; 193.—**Goodale** (J. L.) On the identity of the conditions commonly known as wandering rash of the tongue and Moeller's superficial glossitis. Am. J. Med. Sc., Phila., 1896, n. s., cxii, 545-561.—**Grayston** (W. C.) Notes on the treatment and filling of teeth. Dental Rec., Lond., 1896, xvi, 486.—**Hamilton** (H. D.) Non-malignant tumours of the tonsil, with report of a case. Montreal M. J., 1896-7, xxv, 249-251.—**Harrison** (F.) The "x" rays in the practice of dental surgery. J. Brit. Dent. Ass., Lond., 1896, xvii, 624-628.—**Head** (J.) The application of the principle of crown work to metal plates. Internat. Dent. J., N. Y. & Phila., 1896, xvii, 637-639.—**Hill** (B.) and J. H. McLean. "The new photography." J. Brit. Dent. Ass., Lond., 1896, xvii, 628-631.—**Hoffmann** (A.) Ueber die morphologische Stellung der bleibenden Molaren. Deutsche Monatschr. f. Zahnh., Leipz., 1896, xiv, 409-414.—**How** (W. S.) Partial bite-plates. Ohio Dent. J., Toledo, 1896, xvi, 468-472.—**Howard** (F. R.) A method of treatment by porcelain inlaying. Dental Rec., Lond., 1896, xvi, 446-448.—**Hugenschmidt** (A. C.) Experimental study of the different modes of protection of the oral cavity against pathogenic bacteria. Dental Cosmos, Phila., 1896, xxxviii, 797-815.—**Humby** (W. R.) Description of a demonstration of the use of Dr. Herbst's needle for filling cervical cavities. Brit. J. Dent. Sc., Lond., 1896, xxxix, 874.—**Hunt** (G. E.) Antiseptics. Ohio Dent. J., Toledo, 1896, xvi, 475-479.—**Jaramillo M.** (E.) Sobre un caso de macroquilia. Rev. méd. de Chile, Sant de Chile, 1896, xxiv, 121-137, 1 pl.—**Kirk** (E. C.) Dental pedagogics. Dental Pract. & Adv., Buffalo, N. Y., 1896, xxvii, 169-175.—**Klaussner.** Ueber das Eindringen von Fremdkörpern in Trachea Oesophagus. Deutsche Monatschr. f. Zahnh., Leipz., 1896, xiv, 393-

408.—**Labes** (M.) Ueber Metallgebisse mit gestanzten Zahnrücken. Zahntech. Reform, 1896, xvi, 264-267.—**Lane** (W. A.) Four cases of excision of the temporo-maxillary articulation in children. Tr. Clin. Soc., Lond., 1896, xxix, 1-6.—**Leary** (M. E.) Pyorrhœa and lithæmia. Dent. Pract. & Adv., Buffalo, N. Y., 1896, xxvii, 182-184.—**López Arrojo** (L.) Ulcera extensa especifica en la lengua; curación. Corresp. méd., Madrid, 1896, xxxi, 275.—**Loup** (A.) Contribution a l'étude de la greffe dentaire. Odontologie, Par., 1896, 2. s., iii, 514-539.—**Lunn** (J. R.) A case of arthritis deformans with closure of the jaws from ankylosis of both temporo-maxillary articulations, successfully treated by division of the necks of both condyles, and a wedge-shaped piece of bone removed. Tr. Clin. Soc., Lond., 1896, xxix, 232-234, 1 pl.—**McCurdy** (S. L.) The treatment of two cases of fracture of the inferior maxilla, by wiring. Dental Cosmos, Phila., 1896, xxxviii, 840.—**McKee** (E. S.) Congenital teeth. Cincin. Lancet-Clinic, 1896, n. s., xxxvii, 382. ——— *Also:* Am. J. Obst., N. Y., 1896, xxxiv, 575.—**MacCormac** (*Sir* W.) Diseases of the tongue. Clin. J., Lond., 1896-7, viii, 385-389.—**Maltese** (F.) Anomalie dei denti e delle arcate mascellari in cranii di criminali. Arch. di psichiat. [etc.], Torino, 1896, xvii, 364-373.—**Marston** (R.) Hints on porcelain tooth and gum compounds. Brit. J. Dent. Sc., Lond., 1896, xxxix, 865-869.—**Maryland** State Dental Law, passed April 4, 1896. Dental Cosmos, Phila., 1896, xxxviii, 871-873.—**Merriman** (A. F.) *jr.* How to elevate the standard of the dental profession. Pacific Stomatol. Gaz., San Fran., 1896, iv, 396-406.—**Milbury** (F. S.) Methods of diagnosticating diseases of the antrum of Highmore, and their treatment. N. York M. J., 1896, lxiv, 519-552.—**Mills** (G. A.) What can we demonstrate? Internat. Dent. J., N. Y. & Phila., 1896, xvii, 639.—**Morgenstern** (M.) Beitrag zur Kenntniss der Nerven in den Zähnen. Deutsche Monatschr. f. Zahnh., Leipz., 1896, xiv, 349-369, 1 pl.—**Moty.** Notes sur la maladie de Fauchard. Gaz. d. hôp., Par., 1896, lxix, 1077.—**Odenius** (M. V.) Bemerkungen und Beiträge zur pathologischen Anatomie der lymphatischen Makroglossie. Nord. med. Ark., Stockholm, 1896, n. F., vi, hft. 3, no. 14, 1-17.—**Papillaut** (G.) Anomalie héréditaire dans la dentition. Bull. Soc. d'anthrop. de Par., 1896, 4. s., vii, 197.—**Pechin** (A.) A contribution to the study of ocular affections and of sinusitis of dental origin. J. Ophth., Otol. & Laryngol., N. Y., 1896, vii, 217-238.—**Perry** (S. G.) Professional fees. Dental Cosmos, Phila., 1896, xxxviii, 815-826.—**Puschmann** (F.) Ueber Goldkronen. Zahntech. Reform, Berl., 1896, xvi, 246-249.—**Raffensperger** (E. H.) Diseased antrum. Ohio Dent. J., Toledo, 1896, xvi, 472.—**Rochard** (Jules Eugène.) [1820-96.] (Nécrologie.) Odontologie, Par., 1896, 2. s., iii, 565.—**Rollins** (W.) Directly connected static machines. Internat. Dent. J., N. Y. & Phila., 1896, xvii, 635-637.—**Royet.** Deux cas d'empyème du sinus maxillaire determinés probablement et entretenus par des séquestres dentaires. Province méd., Lyon, 1896, x, 471.—**Sabrazès.** Sur deux nouveaux cas de polypes de la face interne des joues. Méd. mod., Par., 1896, vii, 594.—**Schott.** Division congénitale du voile du palais et staphylorrhaphie. J. d. sc. méd. de Lille, 1896, ii, 326.—**Stevenson** (W. F.) Note on a case of death from chloroform. Lancet, Lond., 1896, ii, 881.—**Suggett** (A. H.) Dental therapeutics. Pacific Stomatol. Gaz., San Fran., 1896, iv, 393-396.—**Turner** (J. G.) Antral suppuration following invasion by a dental cyst. Clin. J., Lond., 1896-7, viii, 394-396.—**Vollert.** Noch einmal das Eucaïn. München. med. Wchnschr., 1896, xliii, 865.—**Washbourn** (J. W.) and K. W. Goadby. Some points in connection with the bacteria of the mouth. Internat. Dent. J., N. Y. & Phila., 1896, xvii, 642-652.—**Wassall** (J. W.) The disinfection of pulpless teeth. Dental Cosmos, Phila., 1896, xxxviii, 829-834.—**Witzel** (J.) Ueber Zahnwurzelcysten, deren Entstehung, Ursache und Behandlung. Deutsche Monatschr. f. Zahnh., Leipz., 1896, xiv, 369; 415.—**W[retlin]d** (E. W.) Våra barns tänder. [Our children's teeth.] Hälsovännen, Stockholm, 1896, xi, 243-246.

◆

LIST OF UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING OCTOBER, 1896.

October *6.*—No. 569,093, to James W. Dennis. Dental tool and plugger.
" *13.*—No. 569,210, to C. H. Land. Rest for dental engine tools.
" " No. 569,380, to M. W. Hollingsworth. Dental cataphoric apparatus.
" " No. 569,409, to G. C. Courtright and J. W. Purdy. Rotary tooth-brush.
" " No. 569,535, to P. B. Barnes. Dental plate-polishing tool.
" " No. 569,540, to E. E. Carlton. Neck protector.
" *20.*—No. 569,870, to E. H. Hamilton. Tooth-brush.
" " No. 569,911, to Levitt E. Custer. Electrical muffle or heater.
" *27.*—No. 570,044, to A. T. McMillin. Means for constructing seamless metal tooth-crowns.

INDEX TO VOLUME XXXVIII.

ABBEY'S gold foil, 157, 159, 163, 304.
Abbott, A. C., "The Principles of Bacteriology," review of, 444.
Abbott, F., histological theories of, 209, 455, 473.
  on anatomy of the antrum, 949.
  lantern exhibit by, 168.
  method of pulp-treatment, 832, 860, 862.
  on Dental Protective Association, 354.
  on sensitiveness of dentine, 138.
  on silver nitrate in root-canals, 757.
  treatment of antral disease, 167.
Abbott, J. T., on dental education, 651.
  on gold in dentistry, 659.
Abnormalities, cast fillings for, 854.
Abscess, abortion of by cataphoresis, 566.
  from abnormal tooth, 28.
Abutments for bridges, 853, 858.
Academy of Stomatology, monthly meetings of, 243, 344.
Accounts, management of, 822.
Accuracy in scientific work, 786.
Acetanilid in implantation of teeth, 187.
Acetic acid, combination of with mercury bichlorid, 208.
Acid secretions of the mouth, 420, 767, 793.
Acid theory of dental caries, 298, 323, 381, 1027.
Aconite, cataphoric application of, 703.
Adair, R. D., on pulp-capping, 163.
  on pyorrhea, 677.
Adamy, H. W., on cocain, 88.
Adaptation of fillings, 303.
Age, relation of to pyorrhea, 346.
Air as an oxygenating agent, 136.
Air-chambers, L. P. Haskell on, 181.
Alabama Dental Association, annual meeting of, 255.
Alcohol as a dehydrant, 138, 205.
  as an antiseptic, 1010.
  as a dental obtundent, 88.
  impurities in, 449, 614, 616.
  influence of on physical properties of gold, 614, 616.
  production of uric acid by, 492.
Alexander, C. L., "Casting Fillings and Abutments for Bridges," 850.
  suspension denture and disk mandrel, 425.
Allan, C. F., "The Needs of Our Profession: How can they Best be Met?" 369.
Allan, G. S., "The Contour Filling. A Study," 321.
Allen, C. A., "Concerning Vulcanite," 727.
Allen, H. J., "Fœtor ex Ore. Pathology and Therapy," 626.
Allen, J., suggestions for artificial teeth, 948.
Allen, T. M., on dentistry and medicine, 250, 251.
  on gold foils, 158.
  on prosthetic dentistry, 63.
  on pulp-capping, 157.
All-gold crowns, setting of, 860.
  substitute for, 855, 858.
Alloys, ageing of, 43, 965.
  annealing of, 978.
  new, 332.
Allwine, H. W., "Molecular Attraction in Root-Filling," 379.
Aluminum, modification of silver-tin amalgam by, 989.
Alumni Association, New York College of Dentistry, officers for 1896, 255.
Alumni reunion, Baltimore College of Dental Surgery, 255.
Alveolar abscess, M. L. Rhein on, 193, 832.
  cataphoric treatment of, 410.
  discussion on, 237.
  necrosis from, 508.
Alveolar process, absorption of in pyorrhea, 317.
  absorption of in treatment of irregularities, 908.
Amalgam as a filling-material, 323, 327, 341, 550, 761, 927.
Amalgam fillings, bulging of, 148.
Amalgams, ageing of, 965.
  flow of under stress, 981.
  oxidation of, 968.
  shrinkage of, 43, 604, 966, 983.
Ambidexterity, advantage of to the dentist, 253.
Ambler, H. L., "Nodule on Apex of Root," 1013.
  case of abnormal dentition, 600.
  on silver nitrate in root-canals, 757, 760.
Ameloblasts, calcification of, 101, 501.
  structure and function of, 888.
American Academy of Dental Science, action on death of Dr. Dwinelle, 447.
American College of Dental Surgery, commencement of, 519.
American Dental Association, annual meeting of, 164, 352, 512, 600, 749, 860, 944, 1013.
  delegate system of, 639.
  local arrangements for, 608.
  officers for 1896, 762.
  revision of constitution of, 1022.
American Dental Society of Europe, annual meeting of, 524.
American dentistry in Europe, A. V. Elliott on, 911.

American Journal of Dental Science, establishment of, 779.
American Medical Association, Dental Section, annual meeting of, 435, 500, 569, 660, 736.
  officers for 1896, 748.
American Society of Dental Surgeons, organization of, 779.
American System of Dentistry, forthcoming volume of, 172.
Ames, W. V. B., on cataphoresis, 655, 752.
  resignation of membership in American Dental Association, 749.
Ammonia, use of in tooth-bleaching, 149.
Ammonol, 1006.
Amoedo, O., "Four Consolidated Dental Implantations," 130.
  "Contribution a l'Etude de l'Implantation des Dents," notice of, 1039.
  on implantation of teeth, 190.
Amyl nitrite as an antidote to cocain, 89.
Analysis, methods of, for uric acid, 526, 611.
Anaphoresis, 211, 995.
Anatomical articulator, 37.
Anatomy, new discoveries in, 172, 871.
  of the maxillary bones, 1.
Anchorages in bridge-work, 205, 514.
Anderson, M., acknowledgment to, 748.
Andrews, C. L., drainage-tube for antral abscess, 236.
Andrews, R. R., card from, 957.
  on artificial teeth, 583.
  on cataphoresis, 743, 744.
  on enamel formation, 101, 126, 269, 453, 501.
  on treatment of antral diseases, 738.
  reply to by Dr. Williams, 887.
Anemic pyorrhea, case of, 496.
Anesthesia, F. Hewitt on, 136.
  by cataphoresis, 48, 210, 941, 942, 960.
Anesthetic compound, Schleich's, 562, 609.
Anesthetics, administration of by dentists, 827.
  physiological action of, 150.
Angle, E. H., lecture by, 646.
Animals, food instinct of, 56.
Annealing, effect of on gold, 309.
Annealing lamps, best forms of, 615, 616.
Anodal diffusion, 211.
Anode, definition of, 993.
Antes, R. H., articulator of, 581.
Antidotes for arsenical poison, 400.
Antipyrin as a hemostatic, 448.
  combination of with cocain, 87.
Antiseptic douche for nasal catarrh, 1046.
Antiseptic mouth-wash, 166.
Antiseptic tablets, 630.
Antiseptic tooth-powder, 886.
Antiseptics, use of in pulp-canals, 238, 241, 831.
Antral disease, J. D. Patterson on, 656.
  W. X. Sudduth on, 736.
  discussion on, 689, 738.
  drainage-tube for, 236, 738, 739, 949.
  spray apparatus for, 167.
Antrum, T. Fillebrown on relation of frontal sinus to, 903.
  anatomical changes of with advancing age, 12.
  faulty description of in text-books, 688.
  penetration of by tooth-roots, 7.
Apparatus for production of the X ray, 481.
  for treatment of fracture of lower maxilla, 773.
Appointments, enforcement of, 823.
Approximal fillings, L. C. F. Hugo on, 595.
  discussion on, 599.
Aqueous solution of pyrozone, 218.
Arch or span filling, W. A. Mills on, 127.
Aristol in pulp-treatment, 154, 156.
Army Medical Museum and Library, D. L. Huntingdon on, 682.
  discussion on, 692, 749.
Arnold, Dr., on salivary calculus, 1026.
Arrington, W. T., "Soft Foil and Conservative Methods," 157, 163.
  gold filling at clinic, 425.
Arsenic as a staining agent, 747.
  in treatment of sensitive dentine, 400.
  use of in pulp-treatment, 199, 205, 791.
Arsenite of potash as a dental obtundent, 90.
Arteries, passage of to teeth, 11.
Articulation, line of, 34.
Articulation of teeth, W. E. Walker on, 573.
  discussion on, 582.
Articulators, discussion on, 62, 426.
Artificial respiration, 954.
Artificial teeth, artistic forms needed, 583.
  carding of, 948.
  effect of on facial expression, 837.
  grinding function of, 37.
  ideal set of, 947, 948.
Asbestos paper in pulp-capping, 150, 163.
Asepticism in replantation of teeth, 186, 187.
Asphyxia, production of in nitrous-oxid anesthesia, 952.
Assistants, employment of in nitrous-oxid anesthesia, 137.
Associations, J. C. Walton on fate of, 638.
Atkinson, C. B., treatment of pyorrhea, 883.
Atkinson, W. H., influence of on dental practice, 544.
  treatment of pyorrhea, 883.
Atlanta Dental College, commencement of, 521.
Atmospheric pressure, adaptation of to artificial dentures, 181, 265.
Austin, Dr., on dental education, 650.
Auxiliary plate support, 708.
Avery, H., obituary of, 1042.

BABBITT metal for counter-dies, 646, 647.
Bacilli, influence of on normal tissues, 900.
Bacteria, color reactions of, 813.
  resistance of tooth-structure to, 551.
Bacterial infection of the mouth, A. C. Hugenschmidt on, 797.
Bacteriology, text-book of, 444.
Baker, E. M., obituary of, 446.
Baldwin, W. H., gold crowns for deciduous teeth, 392.
Ballard, C. W., method of treating pulpless teeth, 862.
Balsamo del Deserto, 156.
Baltimore College of Dental Surgery, alumni reunion of, 255.
  commencement of, 429.
  first faculty of, 779.
Band matrix, use of, 399.
Bar anchorages in bridge-work, 515.
Barber, L. L., on silver nitrate in root-canals, 757.
Barber Surgeons' Association of England, 716.
Barker, A. D., "Gold Filling, with Special Points for Hand Pressure," 730.
Barker, D. W., on alveolar abscess, 238.
Barker, J. T., new instrument for treatment of root-canals, 507.
Barrett, W. C., "The Orbicularis Oris and the Muscles of Expression," 834, 948.

Barrett, W.C., lecture on dental caries, 1027.
  on anatomy of the maxillary bones, 169, 950.
  on dental nomenclature, 1024.
  on dental science, 83, 85.
  on treatment of pulpless teeth, 862.
Barton, Dr., on heredity, 645.
Basal temperaments, 918.
Baxter, E. C., death of, 692.
Beach, H. E., on bridge-work, 858.
  on dentistry and medicine, 252.
  on dry sockets, 930.
  on hygiene, 1009.
  president's address before Southern Dental Association, 61.
Beadles, E. P., "The Lingual Wall," 1010.
  combination gold work, 424.
  on gold foils, 158.
Beals, J., obituary of, 445.
Beatty, C. H., on dental hygiene, 777.
Beebee, J. H., clinic by, 154, 1028.
  on hot air as a dental obtundent, 90.
  on local anesthesia, 90.
Beechwood creasote in pulp-capping, 156, 162.
Beeswax in impression-taking, 154.
Belyea, T. P., method of attaching bands to Logan crowns, 233.
Bennett, F. J., on the physiology of dentine, 876.
Benson, J. H. P., "Dental Hygiene in our Schools and Colleges," 773.
Bergstresser, E., on antisepsis, 512.
Bethel, L. P., "Lining Root-Canals," 755.
  on dental education of the public, 1023.
Bicuspids, difficulty of extraction in edentulous jaws, 23.
Bilious temperament, characteristics of, 633, 634, 918.
Bills, itemization of, 821.
Binary compounds of temperament, 635.
Bing, B. J., hot-air apparatus, 91.
Bingham, S. R., obituary of, 260.
Birmingham Dental College, commencement of, 433.
Bismuth, modification of silver-tin amalgam by, 989.
Bite-lock, Robinson's, 709.
Black, G. V., "The Effect of Oxidation of Cut Alloys for Dental Amalgams," 43.
  "Practical Utility of Accurate Studies of the Physical Properties of the Teeth and of Filling-Materials," 296.
  "The Physical Properties of the Silver-Tin Amalgams," 965.
  analysis of dentine, 829.
  effect of hot air on tooth-structure, 143, 145.
  on density of gold, 398.
  on the peridental membrane, 316.
  on preparation of cavities, 557.
  studies on physical characters of teeth, 83, 208, 512, 579, 1033.
  studies on pyorrhea, 360, 526, 882.
Blackader, A. D., on stomatitis, 383.
Blackstone, W. R., pulp-canal treatment, 144.
Bleaching by cataphoresis, 217.
Bleaching methods, discussion on, 148.
Blind abscesses, treatment of, 198, 624.
Block, H., studies in articulation, 37.
Blood, bactericidal properties of, 802.
Blood-serum as a germicide, 512.
Blood-vessels in enamel-organ, 115, 503, 889.
Bödecker, C. F. W., histological theories of, 125 *note*, 209, 455, 464, 867.
Bogue, E. A., on cataphoresis, 230.
Bogue, E. A., on contour fillings, 343.
  report of two cases of prosthesis, 751.
Bogue matrices, improvements on, 164.
Boice, A., method of setting How crown, 150.
Bone-building foods, 68.
Bone-tissue, grinding of for microscopical work, 933.
Bonwill, W. G. A., anatomical articulator, 37, 63, 64, 426, 574, 581.
  on gold foils, 163.
  on mistakes, 568.
  on pyorrhea alveolaris, 345.
Boozer, J. H., on cataphoresis, 743, 744.
  on pulp-capping, 156.
Border-land tissue, 502.
Borolyptol as a mouth-wash, 630.
Boston Dental College, commencement of, 701.
Boyd, C. L., on pulp-capping, 156.
  on structural changes of teeth, 419.
Brackett, C. A., on durability of fillings, 598.
Bradner, W. F., action of Colorado State Dental Association on death of, 605.
Bread, nutritive value of, 73.
Breath, offensive, treatment of, 626.
Brewster, R. C., on physical properties of teeth, 338.
Bridge-work, H. H. Burchard on principles of, 514.
  Dr. Marshall's method of, 424.
  anchorages for, 205, 850, 858.
  attachment of to jacket crown, 153.
  effect of on tooth-structure, 857.
  electric disturbances from, 605.
Bright's disease, pyorrhea complicated with, 495.
British Columbia, requirements for practice in, 614.
Broach, improved, 206.
Brophy, T. W., "A New Method of Closing the Soft Palate," 601.
  on anatomy of the antrum, 949.
  on anatomy of the maxilla, 170.
  report on anatomy and pathology, 947.
Brown, C. De C., obituary of, 789.
Brown, E. P., on dental caries, 67.
  on physical properties of teeth, 339.
Brown, G. V. I., "Disinfection of the Mouth a Potent Factor in the Treatment of La Grippe," 739.
  gold inlay work, 856.
  on articulation, 582.
  on cataphoresis, 744.
  on endurance of fillings, 302.
  on pyorrhea, 677.
  on treatment of antral diseases, 739.
Bryan, L. C., improved devices, 164.
Bryant, E. A., cases of neuralgia, 690.
Buccal mucus, bactericidal properties of, 806.
Buccinator muscle, function of, 836.
Buffalo Dental Association, annual meeting of, 701.
Bumgardner, E., "Heredity and Pre-Natal Culture," 643.
Bunsen burner, annealing of gold by, 616.
Burchard, H. H., "Some Principles of Bridge-Work," 514.
  auxiliary plate support, 708.
  on dental dehydration, 148.
  on excretion of urea, 488.
  on function of the upper third molar, 1044.
  on liquid silex, 616.
  on the origin of salivary calculus, 792.
  on peroxid of sodium used dry, 449.
  on pyorrhea alveolaris, 349.
  on temperaments, 841.
  reply to by Dr. Thompson, 1004.
Burkett, J. F., on dental education, 651.

Burkhart, H. J., president's address, 692.
  clinic by, 1028.
Butler, C. S., on cocain, 87.
  on dental science, 84.
  on narcosis and forced respiration, 150.
Buxbaum, A. I. F., on cataphoresis, 959.
Byers, W. G. M., and J. S. Ibbotson, "Irritative or Reflex Trismus," 58.

CADMIUM, modification of silver-tin amalgam by, 989.
Cady, C. F. W., case of anesthesia of lower lip, 567.
Cady, H. W. F., cases of necrosis, 508.
  on cataphoresis, 229.
Calcic deposits on teeth, removal of, 319, 676, 677.
  tests for, 313.
Calcoglobulin, development of enamel from, 126, 269, 470, 504, 892.
Calculus, formation of, 351, 946.
Callahan, J. R., use of sulfuric acid in root-canals, 204.
Canals, absence of in enamel, 460, 475.
Cap and gown recommended for commencements, 767.
Caps and crowns for deciduous teeth, L. Ottofy on, 389.
Carbolic acid as a dental obtundent, 89.
  use of in root-canals, 208, 342, 400.
Carbonization of gold, 616.
Carbutt's plate for skiagraphs, 485.
Caries, association of with pyorrhea, 347.
  susceptibility of teeth to, 298.
Carious decalcification of enamel, 468.
Carnivora, facial muscles of, 839.
Carpenter, L. D., on pyorrhea, 678.
Carr, W., acknowledgment to, 393.
  on dental hygiene, 69.
Carroll, R. A., obituary of, 180.
Cassidy, J. S., memorial address by, 530.
  report on materia medica and therapeutics, 355, 751.
Cast fillings, C. L. Alexander on, 850, 856.
  discussion on, 854.
Cast gold, effect of hammering on, 309.
Cataphoresis, A. I. F. Buxbaum on, 959.
  T. Duncan on, 992.
  H. W. Gillett on, 132.
  F. W. Low on, 1028.
  D. F. McGraw on, 735.
  W. J. Morton on, 48, 210, 328, 400.
  M. L. Rhein on, 940.
  caution in, 533.
  discussion on, 223, 409, 565, 652, 654, 743, 1031.
  early experiments in, 702.
  priority in, 735, 752.
  scientific principles involved in, 256, 501.
Cataphoric electrode, Morton's, 48, 52, 329.
Catarrh, connection of with pyorrhea, 318.
  offensive odors from, 628.
Catching, B. H., on articulation, 582, 583.
  on pyorrhea, 677, 678.
Catching's Compendium for 1895, review of, 445.
Cathode, definition of, 993.
Cavities, dehydration of, 137.
  preparation of for gold filling, 310, 327, 398, 557.
  varnishing of, 604.
Cell selector for cataphoresis, 566.
Cellular structure of enamel, 101.
Cements for porcelain work, 694, 695, 696.
  permanency of, 874, 875.
Cervical clamp, Bryan's, 164.
Character, hereditary transmission of, 643.
Chase, E. E., on care of children's teeth, 647.
Chemical treatment of pulp-canals, 507.
Chemistry, relation of to dental practice, 438.
Chemists *vs.* dentists, 865.
Chester and Delaware Counties Dental Society, officers for 1896, 254.
Chewing-gum, use of, 347.
Chicago College of Dental Surgery, action on death of Dr. Garretson, 178.
  commencement of, 517.
Chicago Dental Society, officers for 1896, 437.
  organization of, 261.
Children's teeth, F. Slater on, 647.
  care of, 69, 387, 389, 417, 425.
  new text-book on, 96.
Chlorid of gold as a staining agent, 471.
Chlorin as a bleacher, 149.
  effect of on tooth-tissue, 218.
Chloroform, combination of with formaline, 356.
  use of in root-filling, 380.
Chloro-percha as an insulator, 182.
  in pulp-capping, 154.
Choquet, J., "La Photomicrographie, Histologique et Bacteriologique," review of, 1038.
Chrome steel, abandonment of for dental instruments, 372.
Chromic acid, use of in pyorrhea, 882.
Chromogenic bacteria of the mouth, 799.
Chronic alveolar abscess, 196.
Cincinnati Academy of Dentistry, officers for 1896, 606.
Cincinnati College of Dental Surgery, commencement of, 520.
Claude, G. H., "Pathology and Therapeutics of Dead Teeth," 843.
Clement, H. A., paper read by, 427.
Cleveland University, Dental Department, commencement of, 429.
Climate, effect of on bridge-work, 856.
Clinics at New York Odontological Society, 393, 507.
  at Southern Dental Association, 423, 926.
  at union meeting in Rochester, 1028.
  advantages of, 724.
Clowes, J. W., amalgam filling by, 233.
Coagulants in root-fillings, 760, 833, 863.
Cocain, E. J. Hausle on, 85.
  G. E. Hunt on, 356.
  as a local anesthetic, 257.
  cataphoric application of, 134, 216, 220, 405, 566, 654, 735, 753, 877, 940, 946.
  combination of with guaiacol for local anesthesia, 51, 53, 330.
  discussion on, 87.
  dosage of, 356.
  hypodermic use of, 86.
  physiological effects of, 87, 227, 230.
  substitute for, 1006.
  surgical uses of, 1042.
  use of in devitalizing paste, 376.
Cohesive gold, properties of, 305, 334, 586, 616.
Cold air as a dehydrant, 138.
College of Dentists of England, report on electricity as an anesthetic, 704.
College of Physicians of Philadelphia, Transactions, notice of, 445.
Color reactions of bacteria, 813.
Color test for uric acid, 527.
Colorado Board of Dental Examiners, annual meeting of, 524.
Colorado State Dental Association, officers for 1896, 605.
Colors, selection of in porcelain work, 151.

Columbian silver, 332.
Columbian University, Dental Department, commencement of, 521.
Colyer, J. F., "Extraction of the Teeth," review of, 870.
Commissioner of Education, Report for 1892-93, notice of, 445.
Compound fillings, electro-chemical action of, 602.
Compressed air, use of in operative dentistry, 166.
Condensation of fillings, 305.
Condylarthrosis, 36.
Condyles, movements of in mastication, 34, 64, 578.
Condylo-facial angle of jaw, 576.
Connecticut Valley Dental Society, consolidation of with New England Dental Society, 357.
Conservatism in dental practice, 325.
Constitutional causes of pyorrhea, 315, 318, 352.
Consultation fees, 937, 938.
Continuous-gum work, 154.
Contour fillings, G. S. Allan on, 321.
  discussion on, 342, 597.
Coon, W. W., on salivary calculus, 1026.
Co-operation, L. C. Wasson on, 655.
Copper, modification of silver-tin amalgam by, 988.
Copper amalgam, action of acid secretions on, 793.
  as an antiseptic, 161, 327, 342.
Copper canal-points, Gramm's, 143.
Copper electrodes for cataphoric medication, 222.
Corn meal, nutritive principles of, 415.
Coston, W. A., on making metal dies, 647.
Cotton drainage-tube, 207, 949.
Cowardin, L. M., on dental hygiene, 418.
  on pulp-capping, 157.
Cravens, J. E., method of pulp-treatment, 162.
  treatment of pyorrhea, 883.
Crawford, J. Y., on cast fillings, 855, 856, 857, 859.
  on dry sockets, 929, 930, 931.
  on filling-materials, 928.
  on hygiene, 1009.
  on prosthetic dentistry, 64.
  on pulp-treatment, 162.
  on soft gold as an antiseptic, 159.
  on dental hygiene, 416, 926.
  president's address, 750.
Cribriform tube of inferior maxilla, 21.
Crookes, W., fourth condition of matter, 479.
  vacuum tubes of, 479.
Crouse, J. N., gold filling furnished for test, 307.
  on dental journalism, 568.
  on Dental Protective Association, 342, 354, 655, 949.
  on Wells memorial, 352.
Crown, extemporized, 793.
Crown-work, demonstration of, 150, 151.
  detachable porcelains for, 636.
  new device in, 732.
  preparatory treatment, 205.
Cruet, Dr., treatment of pyorrhea, 882.
Cryer, M. H., "Studies of the Maxillary Bones," 1.
  case of necrosis, 691.
  correction by, 178.
  demonstration of surgical engine, 850.
  lantern exhibit by, 157, 172, 687.
  studies in dental anatomy, 688, 689, 871, 950.
Cummins, W. G., gold crowns for deciduous teeth, 392.
Current, best form of for cataphoric medication, 214, 224, 226, 230, 328, 408, 565, 943.
Curtis, G. L., on alveolar abscess, 237.
Cushing, G. H., instruments for pyorrhea, 884.
Cuspids, esthetic function of, 839.
  impacted in upper jaw, 17.
Cusps for crown- and bridge-work, 733.
  function of in artificial teeth, 579, 583.
  normal articulation of, 38, 63.
Custer, L. E., "The Electric Oven," 352.
  clinical demonstration of, 425, 1028.
  on cataphoresis, 652, 654, 753, 1031.
Cut alloys, effect of oxidation on, 43.
Cutler, S. P., transplantation of teeth by, 185.
Cysts, W. A. Mills on, 594.
  D. E. Wiber on, 592.

DARBY, E. T., acknowledgment to, 2.
  excavators of, 395.
  gold fillings furnished for test, 304.
  on Hewitt's anesthesia apparatus, 137.
  on implantation of teeth, 244, 245.
  on pyorrhea alveolaris, 349.
Davenport, I. B., method of porcelain filling, 694.
  studies in articulation, 37.
Davenport, W. S., method of porcelain filling, 693.
David's modeling compound, 533.
Davis, N. S., on dentistry as a specialty of medicine, 388.
Dead teeth, G. H. Claude on, 843.
  discussion on, 845.
  misuse of term, 827, 845.
Deane, W. C., on implantation of teeth, 245.
Dearborn Refining Company, alloys for tests, 45.
Decalcified teeth, implantation of, 190.
Deciduous teeth, removal of, 926.
  treatment of, 162, 553, 648, 649.
De Ford, W. H., "Söderberg's Method of Preserving Devitalized Tooth-Roots," 651.
Degenerates, liability of to antral diseases, 739.
  pyorrhea in, 317.
Degree, new, proposed, 249.
Dental Alumni Association of Los Angeles, organization of, 173.
Dental anatomy, neglect of, 950.
  researches in, 687.
Dental bibliography, 99, 182, 266, 366, 450, 534, 617, 710, 794, 878, 962, 1047.
Dental caries, W. C. Barrett on, 1027.
  H. Gerhart on, 898.
  S. S. Stowell on, 54, 922.
  discussion on, 67.
  electro-chemical theory of, 602.
  medicinal prevention of, 381.
  microbe theory of, 798.
  ordinary process of, 323.
  prophylaxis of, 370.
Dental colleges, advanced methods in, 846.
  first establishment of, 778.
  multiplication of, 252.
  regulations for admission of students, 764.
  statistics of, 763, 1022.
  unjust criticism of, 649.
Dental Convention in Binghamton, 73, 150.
  in Rochester, 1025.
  in Washington, 357, 583, 679, 767.
Dental Cosmos, excess of matter for, 95, 363.
  publisher's notices, 96, 1043.
Dental diplomas, interstate registration of, 750, 848.
  new regulations for in England, 873.

Dental education, A. O. Hunt on, 649.
  W. A. Mills on, 679.
  discussion on, 250, 649, 679.
  half-century mark in, 530.
  report on, 1022.
Dental education of the public, J. H. P. Benson on, 773.
  A. J. Flanagan on, 827.
  discussion on, 1023.
Dental educational methods, 93.
Dental enamel, R. R. Andrews on formation of, 501.
  J. L. Williams on formation and structure of, 101, 269, 453, 887.
Dental engine, device for maintaining tension on driving-cord, 245.
  Register's, 396.
Dental ethics, H. E. Beach on, 62.
Dental fees, regulation of, 820, 829, 934.
Dental histology, erroneous teaching of, 457, 464, 744, 868.
Dental history, R. F. Hunt on, 777.
  W. H. Trueman on, 713.
  discussion on, 783.
  editorial note on, 789.
Dental hygiene, J. H. P. Benson on, 773
  R. C. Young on, 414.
  discussion on, 416, 776.
Dental journalism, 94, 568.
Dental law of British Columbia, 614.
  of Maryland, 871.
Dental ledger, Bryan's, 164.
Dental legislation, A. W. Sweeny on, 846.
  report on, 845.
Dental literature, scientific research in, 95.
Dental museum and library, 682, 692, 749.
Dental nomenclature, report on, 1023, 1036.
Dental obtundent, need for, 370.
Dental organizations, plan for consolidation of, 562.
Dental patents, monthly list of, 100, 184, 268, 368, 452, 536, 620, 712, 796, 880, 964, 1048.
Dental pedagogics, 92.
Dental plates, contraction of in vulcanizing, 729.
Dental Protective Association, claims of, 655, 692.
  discussion on, 354.
  litigation of, 949.
Dental pulp, connection of with pyorrhea, 348.
  morphology of, 1014.
  vital action of, 82.
Dental quackery, prevention of, 849.
Dental science, S. B. Palmer on, 73.
  advent of in the United States, 713, 778.
  discussion on, 83.
Dental services for the poor, 385.
Dental societies, management of, 640, 723.
  origin of, 639.
  topics for discussion in, 91.
Dental Society of the State of New York, annual meeting of, 358, 692, 931.
Dental Society of Southwestern Michigan, annual meeting of, 358, 702.
Dental students, literary training of, 177.
  preliminary education of, 650.
Dental veterans, 789, 1037.
Dental vulcanite, W. S. How on, 376.
Dentinal dehydration, C. V. Kratzer on, 137.
  discussion on, 144.
Dentine, analysis of, 829.
  recalcification of, 744.
  sensitiveness of, 138, 159, 743.
Dentine, sterilization of by cataphoresis, 404.
  strength of, 300.
  touch bulbs in, 875.
Dentistry and medicine, W. E. Walker on, 246.
  discussion on, 250.
Dentistry, C. F. Allan on needs of, 369.
  A. V. Elliott on practice of in Europe, 911.
  as a profession, 54, 70, 373, 388, 780, 820, 826.
  application of Roentgen ray in, 401, 485, 529.
  esthetics in, 999.
  illegal practice of in Great Britain, 865.
  literary phase of, 175.
  of the future, 57.
Dentition, diseases of, 569.
  order of, 168.
  retarded, 600.
Dento-electric cautery, 139.
Dermoid cysts, W. A. Mills on, 586.
  discussion on, 592.
De Trey, E., new mat gold, 165.
Dewey, M., address before Faculties Association, 763.
Diabetic pyorrhea, case of, 494.
Diamonds in artificial teeth, 693.
Dies, making of direct from impression, 646.
Diet in uric-acid dyscrasia, 491, 511.
  relation of to dental caries, 55, 71, 387, 415.
Diffenderfer, C. R., cases of neuralgia, 690.
Differential diagnosis, G. A. Maxfield on, 621.
Diiodoform, 355.
Dillehay, D. W., on chloro-percha as an insulator, 182.
Dinely, W., the first American dentist, 717.
Discussion on alveolar abscess, 237.
  on anatomy of the antrum, 949.
  on antral diseases, 689, 738.
  on articulation of teeth, 582.
  on bleaching methods, 140.
  on care of children's teeth, 647.
  on casting fillings, 854.
  on cataphoresis, 223, 409, 653, 743, 942, 1031.
  on chemical treatment of root-canals, 507, 757, 845, 860.
  on cocain, 87.
  on contour fillings, 342, 585, 599.
  on dental caries, 67, 922.
  on dental education, 649, 679.
  on dental history, 783.
  on dental hygiene, 416, 776.
  on Dental Protective Association, 354.
  on dental science, 83.
  on dentinal dehydration, 144.
  on dentistry and medicine, 250.
  on dermoid cysts, 592.
  on Dr. Cryer's lantern exhibit, 169.
  on dry sockets, 929.
  on effect of oral diseases on the general health, 571.
  on the facial muscles, 947.
  on gold foils, 158.
  on heredity, 645.
  on hygiene, 1009.
  on local anesthetics, 89.
  on making metal dies, 646.
  on mistakes, 568.
  on milk of magnesia, 770.
  on physical properties of the teeth, 333.
  on plantation of teeth, 243.
  on porcelain-work, 153, 931.
  on professional fees, 934.

Discussion on prosthetic dentistry, 62.
  on pulp-capping, 155, 159, 651.
  on pyorrhea alveolaris, 344, 510, 676.
  on the teeth in relation to temperament, 658.
Donnally, W., "Treatment of Oral Acidity with Milk of Magnesia," 767.
  cases of antral disease, 690.
  on contour fillings, 600.
  on dental education, 679.
  on dental hygiene, 776.
  report on National Museum and Library, 749.
Dorsenia, 87.
Dotterer, L. P., on prosthetic dentistry, 63.
Drainage-tube for antral abscess, 236, 738, 739, 949.
Drawings *vs.* photographs in histological work, 458.
Drills, broken, removal of from root-canals, 202.
  notched, for treatment of jaw-fracture, 840.
Driscoll, W. E., on pulp-capping, 265.
Drugs, administration of by dentists, 828.
Druggists as dental practitioners, 865.
Dry sockets, discussion on, 929.
Dunbracco, W. W., on dental museum and library, 692.
Duncan, T., "Shall it be Cataphoresis?" 992.
Dwinelle, W. H., obituary of, 258, 364.
  resolutions on death of, 447, 509.
  tribute to from New York Odontological Society, 393, 509.
Dwinelle clinic, organization of, 510.
Dyscrasia of dental caries, 382.
Dyspepsia, dental causes of, 570.

EAMES, W. H., on prosthetic dentistry, 948.
Eastern Illinois Dental Society, annual meeting of, 175.
Eastern Ontario Dental Association, annual meeting of, 526.
Ebstein's theory of erosion, 490.
Ecclesiastical fees, 816.
Edentulous jaws, artificial dentures for, 64.
Edison, T. A., theory of the X ray, 481, 484.
Edison current, application of to cataphoresis, 227.
Educational methods, defects of, 715.
Ehrlich's coloring process, 812.
Eighth District Dental Society of New York, annual meeting of, 516.
Electric current, management of in dental operations, 134.
  measurement of, 996.
  properties of, 212.
Electric furnace, McBrair's, 233.
Electric hot-air injector, 140, 143.
Electric lamp, value of in diagnosis, 845.
Electric osmosis, 211, 403, 992.
Electric oven, claims to priority, 512.
  Custer's, 352, 425.
Electricity in dentistry, 133, 139, 211, 402, 653, 940, 959.
Electro-chemical theory of dental caries, 74, 602.
Electrodes, forms of, 52, 215, 328, 406, 408, 565, 943.
Electro-guaiacol-cocain anesthesia, 220, 876.
Electrolysis, 1029.
Electrozone as a disinfectant, 355.
Elliott, A. V., "The Future of American Dentistry in Europe," 911.
Elliott, A. V., method of porcelain filling, 694.
Embryonal development of tumors, 588.
Embryos, double, 590.
Empirical methods of practice, 440.
Empyema of the antrum, 736.
Enamel, calcification of, 454, 503, 506.
  nutrition of, 744.
  organic matter in, 209.
  sensitiveness of, 876.
Enamel-margins, management of, 557, 595.
Enamel-nodules, H. L. Ambler on, 1013.
Enamel-organ, formation of, 102, 270, 887.
Engine-burs, left-cutting, 557.
Engineering principles in bridge-work, 514.
Environment, influence of on development, 899, 923.
Eosinophile leucocytes, 808.
Erosion, acid theory of, 490, 768.
  cataphoric treatment of, 761.
Escharotics, use of in root-canals, 208.
Eschauzier, F., hot-air treatment of root-canals, 142, 145.
Essential oils, use of in root-canals, 206.
Essig, C. J., "The American Text-Book of Prosthetic Dentistry," review of, 957.
  on physical properties of teeth, 335.
  porcelain fillings of, 932.
Esterley, C. E., crown-work at clinic, 653.
Esthetics in dentistry, J. N. Farrar on, 999.
Eucaine, 610, 754, 1006.
European dentistry, 913.
Evans, W. J., suggestion of cataphoric bleaching methods, 217.
Evolution, human intelligence as a factor in, 902.
Exactness in scientific work, 786.
Examining boards, work of in dental education, 846.
Exostosis, diagnosis of, 624.
Expansion curve of alloys, 47.
Ezard, H. B., on cataphoresis, 876.

FACE, asymmetry of, 581.
  embryonal development of, 589.
  muscles of, 834.
  restoration of by mechanical appliance, 559.
Face-piece, use of in anesthesia, 150, 955.
Facial clinometer, 578, 580.
Facial deformities, correction of, 999.
Facial line, diagram of, 35.
Facial muscles, W. C. Barrett on, 834, 948.
  discussion on, 947.
Facings, detachable, for crown- and bridge-work, 636.
Faraday, M., "radiant matter" of, 479.
Faradic current, tooth-extraction by, 232.
Farrar, J. N., "Esthetics in Dentistry," 999.
Faught, L. A., "Some Notes on the Use of Gold as a Filling-Material," 584.
  on contour fillings, 599.
  on dental history, 783.
  on dental hygiene, 777.
  on the dental pulp, 845.
Fee, etymology of, 815.
Fellows, A. P., paper read by, 427.
Fermentation, prevention of, 923.
Fibrous stroma of enamel, 122.
Fillebrown, T., "A Study of the Relation of the Frontal Sinus to the Antrum," 903.
  on dental anatomy, 1014.

Fillebrown, T., on union of American and Southern Dental Associations, 354.
Filling-materials, J. Head on, 550.
  adaptation of, 74, 326.
  electro-chemical action of, 602.
  studies of physical properties of, 296, 333.
Fillings, finishing of, 558, 585, 933.
  permanency of, 158, 302, 335, 341, 828.
  separate charges for, 821.
Film for developing X ray pictures, 485.
Finley, M. F., cases of epulic tumor, 771.
Finney, W. B., contour work at clinic, 425.
  on dental education, 681.
First District Dental Society, clinics of, 92, 232.
  monthly meetings of, 65, 210, 342, 1006.
Firthe, C. A., "The Treatment and Filling of Devitalized Teeth," 373.
Fistula, treatment of, 234.
Flagg, J., pioneer dentistry by, 719.
Flagg, J. F., "Preparation of Pulp-Cavity and Canals," 199.
  devices for dehydration, 139.
  on ageing of alloys, 43, 972.
  on gold as a filling-material, 85.
  on pulp-mummification, 831.
  revision of Inglis's "Dental Pathology and Therapeutics," review of, 178.
Flanagan, A. J., "Dental Education of the Public," 827.
Flickinger, A., "Diseases of the Oral Cavity a Potent Factor in General Disease," 569, 791.
Florida State Dental Society, annual meeting of, 358.
Fluids, passage of from maxillary sinus, 13.
Focht, A. T., demonstration of porcelain-work, 173.
Focus tube for demonstration of X ray, 481.
Fœtor ex ore, H. J. Allen on, 626.
Fogg, I. S., obituary of, 98.
Food instinct of animals, 56.
Forced respiration in asphyxia, 150.
Forceps, new forms needed, 372.
Formaldehyde as a disinfectant, 355, 356.
Fossil enamel, striations in, 474.
Foster, S. W., on cast fillings, 855.
  on dentistry and medicine, 250, 251.
  on Hinman's prosthetic appliances, 926.
Fouke, G. S., obituary of, 447.
Fowler's solution, dental uses of, 400.
Fractional volt selector, 53, 134, 228, 409.
Fracture of the maxilla, treatment of by wiring, 840.
Franklin, B., connection of with introduction of dentistry into the United States, 720, 722.
Freeman, S., "The Use of Compressed Air in Operative Dentistry," 166.
  correction by, 512.
  on cataphoresis, 230, 409, 410, 411, 412, 413.
  on contour fillings, 342.
Friedrichs, G. J., on cast fillings, 855.
  on hygiene, 1007.
Frink, C. H., "Infiltration-Anesthesia in Dentistry," 562.
Frog's leg galvanoscope, 214.
Frontal sinus, relation of to the antrum, 903, 949.
Fusible metal, formula for, 647.

GALBREATH, E. A., method of porcelain filling, 696.
Gale, F. P., cases of general disease due to imperfect teeth, 571.
Galvanic action on dental plates, 78.
Galvanic current, effect of on dental pulp, 225.
Galvano-Faradic Mfg. Co., acknowledgment to, 328 *note*.
Ganglionosis, 689.
Gardett, J., early dentistry by, 265, 336, 722.
Gaylord, E. S., acknowledgment to, 394.
  on chemical treatment of root-canals, 507, 508.
Geisler tubes, 479.
Geist-Jacobi, G. P., on introduction of mineral teeth, 1044.
Genese, D., treatment of fistula, 234.
Georgia State Dental Society, annual meeting of, 438.
Geran, J. P., replantation of teeth, 239.
Gerhart, H., "Do we Know Anything of the Evolution and Etiology of Dental Caries?" 898.
Germicides, effect of on tooth-structure, 342, 901.
Gilbert, S. E., on formalin, 356.
Gillett, H. W., "Cataphoresis for Obtunding Sensitive Dentine," 132.
  on cataphoresis, 223, 229, 232, 743, 940.
  resignation of from American Dental Association, 749.
Gilmour, H. L., paper read by, 427.
Gingival origin of pyorrhea, 349.
Gingrich, W. H., death of, 62.
Glass as a filling-material, 153, 695, 696, 934.
Gleason, Dr., acknowledgment to, 2.
Glenoid fossa, slant of, 34.
Globular bodies in enamel, 278.
Gluten, nutritive value of, 57.
Glycerol, 94.
Glycosuria, case of, 495.
Goddard, C. L., dental anomalies, 66.
Gold and amalgam, combination of, 928.
Gold and gutta-percha fillings for frail teeth, 150.
Gold and tin fillings, 603.
Gold, annealing of, 615.
  as a filling-material, 85, 399, 584, 659, 931.
  modification of silver-tin amalgam by, 988.
  physical properties of, 302, 333, 398.
Gold filling, A. D. Barker on, 730.
Gold foils, antiseptic action of, 551.
  discussion on, 157.
Gold inlays, 856.
Goodspeed, Prof., experiments with the X ray, 485.
Goodyear Dental Vulcanite Co., royalties of, 354.
Gorgas, F. J. S., new edition of Harris's "Principles and Practice," 442.
Gould, G. M., "The American Year-Book of Medicine and Surgery," review of, 259.
Gouty diathesis in pyorrhea, 345, 350, 489, 493, 946.
Grady, R., on the dental law of Maryland, 845.
Gramm, C. T., treatment of pulp-canals, 143.
Granular structure of enamel, 465, 476, 504.
Gray, J. P., "Temperaments in Dentistry," 917.
Gray's "Anatomy, Descriptive and Surgical," review of, 870.
Green, T. H., "An Introduction to Pathology and Morbid Anatomy," review of, 258.
Greene, F. A., on local anesthesia, 89.
  on porcelain-work, 154.
  on salivary calculus, 1026.
Greene, P. D., on salivary calculus, 1025.

Greenlaw, M. A., "Some Experiences in the Administration of Nitrous-Oxide Gas," 952.
Greenleaf, R. W., on dentistry as a specialty, 247.
Greenwood, I., early dentistry by, 717.
Greenwood, J., sketch of, 718.
Greenwood, W. P., dental career of, 719.
Griffith, J. F., on extraction of third molars, 931.
Grinding function of the teeth, 37.
Grippe, la, mouth disinfection in, 739.
Griswold flask, best method of vulcanizing with, 376.
Guaiacocain, 220, 232, 330, 406.
Guaiacol as a local anesthetic, 216, 224.
  deodorization of, 877.
  escharotic effects of, 407, 413.
Guaiacol-cocain cataphoresis, W. J. Morton on, 48, 210, 328, 400.
Gudex, V. A., on the uric-acid theory of pyorrhea, 945.
Guide pins in bridge-work, 856.
Guilford, S. H., on dentinal dehydration, 147.
  on migrated teeth, 586.
  report on dental nomenclature, 1023.
Gum-tissue, benumbing of for extraction of teeth, 406.
  hypersensitiveness of, 127.
Gummed envelopes, use of in pulp-capping, 156.
Gutta-percha as a temporary filling, 91.
Gutta-percha cone for root-filling, 207, 241.
Gutta-percha fillings, leakage of, 551.

HAGAN, J. R., case of fracture of lower maxilla, 772.
Handles, choice of for instruments, 396.
Hand-pressure, advantages of in gold-filling, 585, 732.
Hanning, H., case of necrosis, 508.
Harlan, A. W., acknowledgment to, 393.
  introduction of trichloracetic acid, 355.
  on pulp-mummification, 831, 833.
  on silver nitrate in root-canals, 760.
  treatment of pyorrhea, 883.
Harmstad, F., acknowledgment to, 394.
Harris, C. A., work of in dental education, 778.
Harris, C. C., case of neuralgia due to diseased tooth, 689.
  on gold fillings, 585.
  on milk of magnesia, 770.
Harris's "Principles and Practice of Dentistry," review of, 442.
Harrower, D., acknowledgment to, 2.
Hart, J. I., on professional fees, 936, 939.
Harvard cement, setting of, 859.
Harvard Dental Alumni Association, annual meeting of, 700.
Harvard Odontological Society, action on death of Dr. Chandler, 178.
  officers for 1896, 437.
Harvard University, Dental Department, commencement of, 702.
Harvett, J., case of mistaken diagnosis, 234.
Hasbrouck, F., extraction under cataphoresis, 234.
Haskell, L. P., on air-chambers, 181.
Hastings, D. H., welcoming address, 921.
Hausle, E. J., "Cocain," 85.
Hayden, H. H., early studies on pyorrhea, 344.
  tribute to, 780.
Head, J., "The Dental Filling," 550.
  on dental anatomy, 950.
  on passage of electric currents in tooth-substance, 758.
Heckler, J. W., "The Treatment of Teeth and Roots preparatory for Crowning," 205.
  clinic by, 154.
Heitzmann, C., histological theories of, 125 *note*, 209, 455, 458, 464, 868.
Hemorrhage following tooth-extraction, treatment of, 961.
Herbst, W., combination of sulfuric acid and cocain, 230.
Heredity and pre-natal culture, E. Bumgardner on, 643.
  discussion on, 645.
Herring, H. C., on dental education, 252.
Hewitt, F., "Nitrous Oxid and Oxygen," 136.
Hinman, T. P., "A Mechanical Appliance for the Replacement of the Right Superior Maxilla, the Face, and a Portion of the Nose," 559, 679, 926.
Hippocrates on the temperaments, 842.
Histology, advances in, 168.
  false teachings in, 457, 464, 744, 868.
Hodgen, I. N., obituary of, 180.
Hodgen, J. D., "Practical Dental Metallurgy," review of, 1037.
Hodson, J. F. P., on contour fillings, 342.
  on physical properties of teeth, 338.
  on the phosphates as bone-builders, 68.
Hoff, N. S., on formaldehyde, 356.
Hofheinz, R. H., on artificial dental caries, 1028.
  on cataphoresis, 1032.
  on dental science, 84.
  on local anesthetics, 90.
  on porcelain inlays, 932.
  on professional fees, 937.
  on salivary calculus, 1026.
Holland, F., case of antral disease, 571.
  welcoming address, 61.
Hollingsworth, M. W., "Interdental Space Guards," 553.
  clinic by, 1028.
Holmes, Dr., hot-air apparatus, 90.
Homeopathic remedies, action of on the tissues, 511.
Hot air as a local anesthetic, 89, 90, 139.
Hot water, use of in inflammation, 930, 931.
Houston, E. J., "Electricity in Electro-Therapeutics," review of, 444.
How, W. S., "Dental Vulcanite," 376.
  suggestion in nomenclature, 449.
Howe, J. M., on contour fillings, 343.
Huestis, O. M., on dental education, 650.
Huey, R., on tooth-bleaching, 149.
Hugenschmidt, A. C., "Experimental Study of the Different Modes of Protection of the Oral Cavity against Pathogenic Bacteria," 797.
  "Treatment of Pyorrhea Alveolaris," 881.
Hugo, L. C. F., "Approximal Work—the Important Factor Involved," 595.
Hull, A. C., chemical treatment of root-canals, 507.
Hull, H. J., clinic report by, 232.
Humerus, artificial replacement of by apparatus, 751.
Hungerford, C. L., on electricity in dentistry, 653, 655.
  on pulp-treatment, 652.
Hunt, A. O., new anesthetic apparatus, 655.
  on dental education, 649.
  on the muscles of expression, 947.
  on prosthetic dentistry, 646.
  on surgery of the antrum, 656.

Hunt, A. O., on the teeth in relation to temperament, 658.
Hunt, F., "The Dental Profession; Some Points in its History, its Present Status and Relations, and its Responsibilities and Duties," 777.
  on dental hygiene, 777.
Hunt, G. E., "A Suggestion about Cocain," 356.
Hunt, P. G. C., obituary of, 532.
Hunt, W. M., on milk of magnesia, 770.
Huntingdon, D. L., on the library of the Surgeon-General's Office, 682.
Hutchison, J. A., case of irritative trismus, 58.
Hutchinson, Dr., local anesthesia by electricity, 231.
Hydrochloric acid in pulp-canals, 507.
Hydrogen dioxid as a bleaching agent, 217.
  in pulp-treatment, 145.
Hydrogen peroxid as a bleaching agent, 404.
Hydronaphthol in implantation of teeth, 187.
Hygiene, G. J. Friedrichs on, 1007.
Hygienic treatment of pyorrhea, 491.
Hypercementosis, diagnosis of, 624, 626.

IBBOTSON, J. S., and W. G. M. Byers, "Irritative or Reflex Trismus," 58.
Illinois Board of Dental Examiners, annual meeting of, 256.
Illinois State Dental Society, annual meeting of, 358, 605.
  organization of, 261.
  Transactions for 1895, notice of, 98.
Immediate root-filling, 862.
Implantation of teeth, L. Jack on, 185.
  O. Amoedo on, 130.
  case of under cataphoresis, 49.
  discussion on, 244.
Impressions, method of taking with undercuts, 151.
Incisors, overbite of, 36, 41.
Incompatibles, avoidance of, 441.
Indiana Dental College, commencement of, 428.
Indiana State Dental Association, annual meeting of, 525.
Infant foods, 68.
Infantile scorbutus, case of, 66.
Infectious alveolitis, 883.
Inferior dental canal, course of, 688.
Infiltration-anesthesia in dentistry, C. H. Frink on, 562.
  solution for, 877.
Inflammatory theory of caries, 209.
Influenza, mouth-complications of, 740.
Ingalls, C. E., impression-taking, 154.
Inglis, O. E., "Dental Pathology and Therapeutics," review of, 178.
  periods of dental decay, 792.
Inlay work, advantages of, 932.
Inner ameloblastic membrane, 114.
Instruments, selection and use of, 395.
Interdental space guards, M. W. Hollingsworth on, 553.
International Dental Journal, reply to by Dr. Williams, 867.
International Tooth-Crown Co., litigation with, 354.
Interstate dental meeting, call for, 174, 357, 524.
  executive committee for 1900, 660.
  proceedings of, 642.
Interstate legislation in dentistry, 750, 848.
Interstitial electrolysis, 211.
Iodin in antral diseases, 171.
  in discolored teeth, 400, 425.
  in pyorrhea, 321, 346, 352.
Iodin in stomatitis, 384.
  passage of through tissue, 227, 231, 404, 566, 752, 833.
Iodoform, substitute for, 355.
Irregularities, surgical correction of, 907.
Irritative or reflex trismus, 58.
Italian filling, 129.
Itemization of bills, 821, 938.

JACK, L., "Plantation of Teeth," 185, 448.
  acknowledgment to, 394.
  blackboard demonstration by, 150.
  dedication of text-book to, 958.
  on Dental Protective Association, 354.
  on formalin, 356.
  on professional fees, 823.
  on pulp-treatment, 160.
Jack matrix, advantages of, 326.
Jacket crown-work, 152.
Jackson, V. H., correction of irregularities, 1027.
  new metal alloys, 332.
Jacque, D. H., on the temperaments, 632.
Jarvie, W., on mistakes, 568.
  on physical properties of teeth, 337, 338.
  on porcelain inlays, 932.
  on professional fees, 934, 936.
Jaw, framework of, 21.
  movements of in mastication, 34, 573.
  trismus of, 58.
Jenkins, N. S., method of porcelain filling, 698, 933.
Jimble-jaw, 657.
Johnson, C. N., use of alcohol spray in root-canals, 143.
Johnson, S. W., on annealing of gold, 614.
Johnson, W. L., health foods, 57.
Johnston, A. P., on cast fillings, 854.
  on dry sockets, 930, 931.
Jones, R. H., case of replantation, 771.
  on dental hygiene, 776.
  on dermoid cysts, 592.

KANSAS CITY Dental College, commencement of, 433.
Keech, E. P., case of necrosis, 691.
  on dental education, 680.
Kells, C. E., Jr., on amalgam, 927.
  on bridge-work, 856.
  demonstration of the X ray, 1012.
Kells, C. E., Sr., obituary of, 264.
Kennedy, Dr., on pulp-mummification, 652.
Kentucky State Dental Association, annual meeting of, 525.
Kester, P. J., alloys for tests, 45.
Kidder, A. S., obituary of, 790.
Kidneys, excretion of uric acid by, 489, 491.
King, H. F., investigations on root-filling, 651, 653.
Kirk, E. C., "Tooth-bleaching Methods," 148.
  analysis of local anesthetics, 88.
  antiseptic douche for nasal catarrh, 1046.
  cataphoric bleaching methods, 50, 217.
  on anatomy of the maxilla, 171.
  on dentinal dehydration, 144.
  on infantile scorbutus, 66.
  on physical properties of teeth, 334, 336.
  on treatment of furred tongue, 743.
  on use of coagulants in root-filling, 833.
  report of Committee on State and Local Organization, 353.
  treatment of pyorrhea, 883.

Kirkpatrick, R. E., case of trismus, 59.
Knapp, J. R., on prosthetic dentistry, 62.
Knight, A., on decalcification of teeth, 792.
Koecker, L. R., early studies on pyorrhea, 344.
  obituary of, 707.
Kratzer, C. V., "Dentinal Dehydration," 137.
Kreosotum, use of in dental caries, 383, 419.

LABORATORY fillings, 855.
Lamps, best forms of for annealing gold, 615.
Land inlay litigation, 354.
Lane, F. A., on water as a local anesthetic, 610.
Latham, V. A., "The Technique and Pathology of the Peridental Membrane," 744.
  paper by, 167.
  studies on pyorrhea, 667.
Lea Brothers & Co., acknowledgment to, 95, 172.
Lead, absorption of by the mucous membrane, 815.
  as a permanent filling, 164.
  modification of silver-tin amalgam by, 989.
Lead plates, employment of in closure of cleft palate, 601.
Leakage of fillings, 308, 550.
Lee, R. A., on cocain, 87.
Left-cutting burs, C. Witthaus on, 557.
Legal fee system, 821.
LeMaire, J., early dentistry by, 722.
Lennox, C. P., syringe for dentinal dehydration, 139, 146.
LeRoy, L. C., on cataphoresis, 229, 411.
  on dental caries, 71.
  on porcelain inlays, 933.
  on treatment of root-canals, 791.
Lett, I., "Stomatitis the Cause of Various Throat-Diseases," 734.
Leucemia and gout, 489.
Leucocytosis, 809.
Levison, investigation of uric acid, 487, 488, 489, 946.
Lewis, H. M., obituary of S. R. Bingham, 260.
Life, true objects of, 727.
Light, reflected, in diagnosis of dead pulps, 845.
Lime-salts, assimilation of, 69.
  deposition of under fillings, 82.
Lingual wall, the, E. P. Beadles on, 1010.
Liquid silex, precautions in use of, 616.
Liquids, permeation of root-canals by, 379.
Listerine as a mouth-wash, 630.
Litch, W. F., acknowledgment to, 2.
  on bacteriology, 925.
  on dentinal dehydration, 147.
Literary phase of dentistry, 175, 252.
Literary piracy, 951.
Lithemia, connection of with pyorrhea, 88, 494, 674.
Littig, J. B., acknowledgment to, 393.
Local anesthesia, F. J. Woodworth on, 88.
  by cataphoresis, 48, 133, 210, 256.
  discussion on, 89.
  secret preparations for, 88.
  some new developments in, 609.
Logan crowns, attachment of bands to, 233.
  attachment of by gutta-percha washer, 424.
Loretin, 356.
Louisiana State Dental Society, officers for 1896, 436.
Louisville Odontological Society, organization of, 437.
Low bridge litigation, 354, 363.
Low, F. W., "Cataphoresis," 1028.
  on cocain, 87.
  on dental science, 84, 85.
  on local anesthesia, 90.
  on porcelain inlays, 931, 932.
  on salivary calculus, 1026.
Lowry, H. S., clinic report by, 655.
  on heredity, 645.
  on pulp-mummification, 652.
Luce, C. E., on movements of the lower jaw, 573.
Luckie, R. K., on cast fillings, 858.
Lymphadenitis, Dr. Latham's case of, 167.
Lymphatic temperament, characteristics of, 632, 634, 919.

McALPIN, A. C., "Some Practical Points in Porcelain-Work," 151.
McBrair, H. C., electric furnace, 233.
  clinic by, 1028.
McCurdy, S. L., "The Treatment of Two Cases of Fracture of the Inferior Maxilla, by Wiring," 840.
McGraw, D. F., on cataphoresis, 133, 735.
McKellops, H. J., gold and platinum fillings, 933.
  gold fillings furnished for test, 307.
  on care of children's teeth, 648.
  on Dental Protective Association, 354.
  on orthodontia, 643.
  on pulp-capping, 155.
McLoud, L. P., welcoming address, 850.
McManus, J., on anatomical teaching, 172.
  presentation of bas-relief to Philadelphia Dental College alumni, 427.
McMillan, D. J., "The Uses of Gold in Dentistry," 659.
McNaught, J., treatment of dental hemorrhage, 961.
McQuillen, D. N., gold fillings furnished for test, 304.
  on implantation of teeth, 245.
  on mistakes, 568.
McQuillen, J. H., on preparation of cavities, 399.
Magill, W. E., obituary of, 613.
  resolutions on death of, 790.
Magitot, E., on pyorrhea, 314, 882.
Magnesium hydrate as an antacid, 421.
Mallet, hypercementosis resulting from, 625.
Malnutrition, oral expressions of, 486, 946.
Malted milk, caution in use of, 66.
Mandibular condyles, movement of, 573.
Mansfield, H. C., relief of pain following tooth-extraction, 1046.
Manual training, importance of, 253.
Marginal adaptation of fillings, 306.
Marshall, J. S., on anatomy of the antrum, 170.
  on closure of cleft palate, 602.
  on electricity in dentistry, 135, 225.
Marshall, M. C., new method of bridge-work, 424.
  on dentistry and medicine, 254.
Maryland dental law, 845, 871.
Maryland State Dental Association, annual meeting of, 583, 679, 767, 843.
  officers for 1896, 783.
Mascort, A. E., antipyrin and salol as a hemostatic, 448.
Mason, W. L., "Detachable Porcelains for Crown- and Bridge-work," 233, 636.
  clinic by, 1028.

Massachusetts Board of Registration in Dentistry, annual meeting of, 525, 950.
Massage of the gums, 886.
Mastication, effect of on gold fillings, 337, 340.
  with artificial teeth, 39.
Mat gold, new form of, 165.
Materia medica, report on in American Dental Association, 355.
Mathews, R., on making metal dies, 647.
Matrices, L. Jack on use of, 150.
  management of in porcelain fillings, 699.
Maxfield, G. A., "Differential Diagnosis," 621.
  caution in cataphoresis, 533.
Maxilla, lower, case of fracture of, 772.
Maxillary bones, M. H. Cryer on, 1.
  discussion on, 169.
Maxillary sinus, diseases of, 949.
Maynard, E., artistic work of, 546.
Mechanical appliance for replacement of lost tissue, 559.
Mechanical dentistry, charges for, 823.
  neglect of, 859.
Mechanical treatment of pyorrhea, 492.
Mechanics in dentistry, 54, 253, 372.
Medical charities, increase of, 388.
Medical education of dentists, 246, 680.
Medicaments, cataphoric application of, 133, 219.
  spray apparatus for, 166.
Medicine and dentistry, 246.
Medicine as an exact science, 252.
Meharry Medical College, Dental Department, commencement of, 434.
Melotte, G. W., method of taking impressions, 151.
  on cocain, 87.
  on continuous-gum work, 154.
  on hot air as a local anesthetic, 91.
Membrana præformativa in enamel formation, 108, 502.
Mental impressions, effect of in pregnancy, 645.
Mental work, effect of on the teeth, 414.
Mercury, effect of on mucous tissue, 727.
  percentage of in amalgams, 46.
Mercury bichlorid, coagulating property of, 208, 238.
  use of in implantation of teeth, 187.
  use of in pulp-canals, 238, 239, 241, 823, 863.
Mercury diphenyl, fluorescence of, 484.
Metal dies, improved method of making, E. I. Woodbury on, 646.
  discussion on, 646.
Metal fillings, electrical action of, 82, 134, 211, 222, 224, 231.
  pulp-devitalization by, 238.
Metallic electrolysis, 407.
Metallic space-guards for filling deciduous teeth, 553.
Metschnikoff on phagocytosis, 808.
Meyer, J., acknowledgment to, 394.
Michaels, Dr., prosthetic work of, 751.
Michigan State Dental Society, officers for 1896, 1032.
Michigan University, dental journal of, 177.
Microbe theory of disease, 55, 901, 922, 1010.
Micro-organisms, action of on sound teeth, 84.
Milk of magnesia, W. Donnally on, 767.
  discussion on, 770.
Miller, W. D., "Lehrbuch der Conservirenden Zahnheilkunde," review of, 706.
Miller, W. D., experiments with antiseptics, 159.
  on mouth bacteria, 741, 798, 830.
  on pyorrhea in children, 317, 489 *note*.
  theories of on tooth-structure, 208.
  theory of dental caries, 381, 1027.
Milliamperemeter, use of in cataphoresis, 329.
Mills, G. A., filling exhibited by, 233.
Mills, W. A., "Arch or Span Filling," 127.
  "Dermoid Cysts *vs.* Migrated Teeth," 586.
  on dental education, 679, 681.
  on ganglionosis, 689.
  on treatment of cysts, 594.
Mineral teeth, introduction of, 1044.
Minnesota State Dental Association, annual meeting of, 609.
  officers for 1896, 864.
Mississippi Board of Dental Examiners for 1896, 358.
Mississippi Valley Dental Association, annual meeting of, 359.
Missouri Dental College, commencement of, 517.
Mistakes, S. G. Perry on, 537.
  discussion on, 568.
Mitchell, W., method of porcelain filling, 697.
Modeling compound, formula for, 533.
Modified silver-tin alloys, 986.
Molar, upper third, function of, 1044.
Molars impacted in lower jaw, 30.
  normal articulation of, 40.
Molecular attraction in root-filling, H. W. Allwine on, 379.
Moles, removal of by cataphoresis, 410.
Monk, C. J., method of porcelain filling, 695.
Montana gold, 332.
Montana State Dental Association, officers for 1896, 784.
Montell, W. A., on dental education, 680.
  on dental hygiene, 776.
  on milk of magnesia, 770.
  on pulpless teeth, 845.
Morals, true standard of, 819.
Morey drill for opening root-canals, 194.
Morgan, W. H., on treatment of pulpless teeth, 861.
Morgan & Hastings' gold, test of fillings, 304.
Morphology of the pulp, W. H. Richards on, 1014.
Morrison, W. N., on implantation, 1013.
  priority of in transplantation, 448.
Morton, W. J., "Cataphoric Medication of the Mouth," 400.
  "Electric Medicamental Diffusion, or Cataphoresis, and its Relation to Dental Surgery," 210.
  "Guaiacocain Cataphoresis and Local Anesthesia. Outfit and Technique," 328.
  "Guaiacol-Cocain Cataphoresis and Local Anesthesia; A New Cataphoric Electrode and the Wheeler Fractional Volt Selector," 48.
  "The X Ray and its Application in Dentistry," 478.
  and E. W. Hammer, "The X Ray, or Photography of the Invisible," review of, 1038.
  studies on cataphoresis, 877, 941, 1030.
Mouth, disinfection of in la grippe, 739.
  protection of from bacterial invasion, 797, 926.
Mouth-mirror, Bryan's, 164.
  value of in diagnosis, 845, 1011.

Mouth-washes, formulæ for, 384, 385, 743.
Mucus, bactericidal action of, 807.
Mummery, J. H., discovery of connective-tissue fibers in enamel, 502.
  lantern exhibit by, 876.
  microscopical specimens of enamel formation, 124, 455, 463, 467.
Mummifying paste, 375, 555, 651.
Murexid test for calcic deposits, 313, 350, 359, 526, 611, 612.
Murray, H. M., revision of Green's Pathology, 259.
Muscles of the face, function of, 836, 948.
Mutilations, hereditary transmission of, 645.

NÆVUS, removal of under cataphoresis, 51.
Narcosis, C. S. Butler on, 150.
Nasal catarrh, antiseptic douche for, 1046.
Nasal chamber, bacteria of, 799.
  transverse view of, 4.
Nash, J. J., gold filling furnished for test, 304.
Nasmyth's membrane, 114, 502.
National Association of Dental Examiners, annual meeting of, 525.
National Association of Dental Faculties, annual meeting of, 608, 762.
  J. L. Williams on, 867.
  officers for 1896, 767.
National Dental Association, plan for organization of, 562.
National School of Dental Technics, annual meeting of, 784.
National University, Dental Department, commencement of, 606.
Necrosis, treatment of, 234, 508.
Nervous temperament, characteristics of, 633, 634, 918.
Neuralgia from impacted teeth, 31, 32, 569.
Neurotics, pyorrhea in, 317.
New Hampshire Dental Society, annual meeting of, 864.
New Jersey State Dental Society, annual meeting of, 608.
  officers and committees for 1896, 783.
New Orleans Academy of Stomatology, officers for 1896, 437.
New York College of Dentistry, alumni meeting of, 255.
  commencement of, 523.
New York dental law, defects of, 848.
New York Odontological Society, action of on death of Dr. Dwinelle, 365, 393, 509.
  anniversary meeting of, 1033.
  monthly meetings of, 331, 393, 507, 565.
New York State Dental Society, annual meeting of, 692.
  denouncement of secret preparations, 88.
Newkirk, G., "Rhymes of the States," review of, 959.
Newton, R. C., "What shall be Done for the Teeth of the Poor?" 385.
Nisley, J. C., gold fillings furnished for test, 304.
Nitrogen as an anesthetic, 136.
Nitrous oxid, Drs. Thomas and Greenlaw on, 952.
  in pulp-treatment, 139, 146, 147.
Nitrous oxid and oxygen, F. Hewitt on, 136.
Noble, H. B., on dental education, 681.
  on dental history, 783.
  on dental hygiene, 777.
  on dental museum and library, 692.
  on manual training, 253.
  report on dental legislation, 845.
Noble, S. S., on cataphoresis, 655.
Noel, L. G., experience with pulp-capping, 155, 161.
  on gold foils, 158.
  treatment of children's teeth, 425.
Nomenclature of diseases, 310.
Non-cohesive gold, properties of, 305, 334.
North Carolina State Dental Society, annual meeting of, 357.
Northeastern Dental Association, organization of, 357.
  annual meeting of, 864.
Northrop, A. L., acknowledgment to, 393.
  correction by, 512.
  gold fillings furnished for test, 304.
  on cataphoresis, 411, 566.
  on new metal alloys, 332.
  on physical properties of teeth, 337.
  on use of acids in pulp-canals, 507, 508.
Nostrums, dangers of, 87.
Nuclein as a germicide, 512.

OBITUARY resolutions, publication of, 178.
Obtundents, dental, 88.
Occlusion, line of, 34, 65.
Odontoblasts, blood-supply of, 893.
Odontological Society of the National University, officers for 1896, 702.
Odontographic Society of Chicago, officers for 1896, 91.
Odontomata, development of, 589.
Offensive breath, treatment of, 626.
Office, rotation of in dental societies, 723.
Office work, charges for, 822.
Ohio College of Dental Surgery, commencement of, 520.
Ohio Medical University, Dental Department, commencement of, 516.
Ohm's law, 996, 1029.
Onderdonk, P. W., method of attaching Logan crown, 424.
Operative dentistry, advances of, 73.
  discussion on, 154.
Oral acidity, A. M. Scott on treatment of, 420.
  treatment of with milk of magnesia, 767.
Oral cavity, liability of to infection, 797.
Oral diseases as a factor in general disease, S. W. Foster on, 569.
  discussion on, 571.
  treatment of by physicians, 96.
Oral expressions of malnutrition, M. L. Rhein on, 486, 946.
  discussion on, 510.
Oral hygiene, neglect of in public schools, 417.
Orbicularis oris, the, W. C. Barrett on, 834, 947.
Organization, objects of, 639.
Original work, demands of, 369.
Orseille as a staining agent, 471.
Orthodontia, C. J. Tibbetts on, 643.
  discussion on, 646.
Osgood, A., on salivary calculus, 1026.
Osmosis, principle of, 403.
Osseous necrosis, case of, 751.
Otto of roses as a deodorizer of guaiacol, 877.
Ottofy, L., "The Preservation of the Deciduous Teeth by Means of Caps and Crowns," 389.
  report on dental education, 1022.
  resolutions offered by, 353.
Ottolengui, R., case of pyorrhea complicated with Bright's disease, 495.
  correspondent's report to New York State Dental Society, 693.

Ottolengui, R., on porcelain inlays, 933.
  on professional fees, 939.
Ovarian cyst containing teeth, 586.
Oxidation, effect of on dental amalgams, 43.
Oxychlorid, failure of in root-fillings, [illegible].
Oxygen, combination of with nitrous oxid, 136, 955.
Oxyphosphates as dental obtundents, [illegible].
  in children's teeth, 647, 648.

PACIFIC Coast dental congress, 65.
Pain, control of in filling-operations, 50, 132, 138, 142.
Pain following tooth-extraction, treatment of, 929, 931, 1046.
Painless dentistry, the search for, 256.
Palate, cleft, new method of closing, 601.
Palladium chlorid as a staining agent, 747.
Palmer, C., correction by, 178.
  new devices presented to the profession, 1024, 1025.
  on the muscles of expression, 948.
  on professional fees, 825.
Palmer, J. G., case of tooth-bleaching, 233.
  demonstration of guaiacocain, 232.
  on interstate registration in dentistry, 848.
Palmer, S. B., "Dental Science, Then and Now," 73.
  "Evolution in Operative Dentistry from the Electro-chemical Standpoint," 602.
  on local anesthetics, 91.
Pamphlets received, 98, 445, 1039.
Paré, A., revolutionary methods in dentistry and surgery, 720.
Park, R., on migrated teeth, 587.
Parker, C. P., gold filling furnished for test, 304.
Patent litigation, 354, 363.
Pathogenic bacteria, protection of oral cavity against, 797.
Pathological condition, definition of, 900.
Patients, instruction of, 71.
Patrick, J. J. R., death of, 62, 353.
  on dental history, 714.
Patterson, J. D., "Surgery of the Maxillary Sinus," 656.
  on dental education, 650.
  on heredity, 645.
  on neuralgia following tooth-extraction, 170.
  on pulp-mummification, 652, 653.
  on silver nitrate in root-canals, 761.
  on soft gold, 659.
  on the teeth in relation to temperament, 658.
  on treatment of pulpless teeth, 861.
  report on physiology and etiology, 512, 944.
Peabody, F., case of irregularity, 419.
  on copper amalgam, 161.
  on gold foils, 159.
Pearson's Dentist's Appointment Book, notice of, 98.
Pease, C. G., on cataphoresis, 227, 413.
  on dietetics, 510.
  on physical properties of teeth, 337.
  relation of diet to dental caries, 69.
Pedagogical principle in dental teaching, [illegible].
Pedley, R. D., "The Diseases of Children's Teeth, their Prevention and Treatment," review of, 96.
Peirce, C. N., combination of cocain and sulfuric acid, 90.
Peirce, C. N. on etiology of dental caries, 922.
  on sensitiveness of dentine, 138.
  uric-acid theory of pyorrhea, 311, 350, 610, 661.
Pennsylvania Association of Dental Surgeons, organization of, 363.
  officers for 1896, 1032.
Pennsylvania College of Dental Surgery, commencement of, 431.
Pennsylvania Dental Examining Board, annual meeting of, 524.
  resolutions on death of Dr. Magill, 790.
Pennsylvania State Dental Society, annual meeting of, 137, 525, 921.
  officers and committees of, 435.
Peridental membrane, changes of in pyorrhea, 314.
  normal strength of, 301.
  technique and pathology of, 744.
Periods of dental decay, 792.
Perry, S. G., "Mistakes," 537.
  "Professional Fees," 815.
  acknowledgment to, 393.
  gold filling furnished for test, 304.
  offers resolutions on death of Dr. Dwinelle, 509.
  on cataphoresis, 412.
  on dental caries, 71.
  on hygiene, 510.
  on new metal alloys, 332.
  on physical properties of teeth, 334, 338.
  on porcelain inlays, 932, 933.
  presentation of instruments to New York Odontological Society, 394.
Perry separators, advantages of, 371.
Personal responsibility, 726.
Peterson, F., on cataphoresis, 133, 403.
Phagocytosis, 808.
Phenol sodique as a mouth-wash, 743.
Philadelphia College of Dental Surgery, organization of, 363.
Philadelphia Dental College, alumni meeting of, 417.
  commencement of, 429, 607.
Phillips, W. C., on cataphoresis, 226, 410.
Phillips's milk of magnesia, 422, 767.
Phloroglucin as a decalcifier, 747.
Phosphates as bone-builders, 69.
Phosphorated oil in pulp-treatment, 449.
Phrenology as a pseudo-science, 842.
Physical culture as a preventive of dental caries, 55.
Physicians, fee system of, 826.
  lack of dental knowledge by, 250, 386, 776.
Physiological articulator, Walker's, 38.
Physiology and etiology, report on, 512.
Pigmentation of enamel, 476.
Plagiarism, flagrant case of, 950.
Plasma, organization of in implantation cases, 190.
Plasm-strings of the ameloblasts, 897.
Plastics as filling-materials, 75, 158, 339, 693.
Plates, device to prevent slipping, 708.
  metal, swaging of over plaster die, 859.
  rocking of, 41, 181.
Platinum, rolling of, 855.
  modification of silver-tin amalgam by, 988.
  solder for, 265.
Platir, 449.
Plugger-points, choice of for gold filling, [illegible].
  new forms of, 731.
Poland water, advantages of, 510, 511.
Pole-finder for electric batteries, 213.
Pool, W. T., on prosthetic dentistry, 63.

Porcelain faces, W. L. Mason on, 636.
  F. M. Shriver on, 655.
  attachment of gold cusps to, 233.
Porcelain teeth, early improvements in, 948.
Porcelain-work, A. C. McAlpin on, 151.
  discussion on, 153, 931.
  methods of practice in Europe, 693.
Post-mortem changes in enamel, 504.
Potassium, use of in stomatitis, 384.
Potassium and tin in pulp-canal treatment, 142.
Powel, C. B., gold fillings furnished for test, 307.
Pregnancy, care of the teeth in, 423.
Prescription-writing in dentistry, 828.
Preservative media for microscopical specimens, 748.
Probe, passing of into antrum, 5, 13.
  use of in root-canals, 204.
Professional congeniality, H. D. Wilson on, 572.
Professional fees, S. G. Perry on, 815.
  discussion on, 934.
Prosthetic dentistry, W. E. Walker on, 34.
  discussion on, 62.
  new text-book on, 957.
  report on, 850.
Protoplasm, structure of, 125 *note*.
Pseudo-diphtheritic bacillus, 798.
Ptomaines, toxic properties of, 830.
Public schools, dental hygiene in, 417, 774, 828.
Pulp-capping, W. E. Driscoll on, 265.
  G. White on, 154.
  discussion on, 155, 163, 622.
Pulp-exposure, treatment of, 195.
Pulp-mummification, paste for, 375, 555, 651.
Pulp pain, 622.
Pulp-treatment, W. H. De Ford on, 651.
  J. F. Flagg on, 199.
  L. C. LeRoy on, 791.
  discussion on, 652.
Pulpless teeth, A. Flickinger on treatment of, 554.
  disinfection of, 829.
Punk, advantage of for electrodes, 215.
Pus infection, process of in pyorrhea, 316.
Putrefaction, chemical changes of, 830.
Pyorrhea alveolaris, A. C. Hugenschmidt on, 881.
  F. L. Sibley on, 88.
  E. S. Talbot on, 310, 660.
  W. H. Trueman on, 448.
  cataphoresis in, 223, 412, 565, 944.
  discussion on, 344, 510, 676.
  etiological classification of, 489.
  relation of articulation to, 65.
  uric-acid theory of, 610, 945.
Pyorrhea complex, treatment of, 491.
Pyorrhea of pregnancy, case of, 496.
Pyridine, sophistication of alcohol with, 616.
Pyrozone as a bleaching agent, 149, 217.
  caution in use of, 1045.
  use of in root-canals, 208.

QUINCY Dental Club, organization of, 174.

RABIES, microbe theory of, 924.
Radiant matter of Faraday, 479.
Radiographs of living teeth, 482, 483, 486.
Reade, J., abnormal cast from Samoan Islands, 66.
Red tape in dental legislation, 849.
Reese, G. F., case of necrosis, 234.
Reese, W. J., uric-acid theory of pyorrhea, 661.
Reflecting tubes for production of the X ray, 481.
Reflex irritation from the teeth, 60.
Refrigeration as a dental obtundent, 89.
Register, H. C., combination filling, 150.
  dental engine device, 245, 396.
  on dentinal dehydration, 146.
  on tooth-bleaching, 149, 150.
  on cataphoresis, 412.
Regulating appliances, 498.
Replantation of teeth, 186, 189, 239, 242, 771.
Reservoir cataphoric electrode, 52.
Resorption of implanted teeth, 192.
Rest as a curative agent, 510.
Retaining fees, 817.
Retaining fixture for implantation of teeth, 245.
Rhein, M. L., "Alveolar Abscess; Prevention and Curative Treatment," 193, 832.
  "The Oral Expressions of Malnutrition," 486, 946.
  drainage-tube for antral disease, 236.
  on care of children's teeth, 164.
  on cataphoresis, 220, 226, 227, 412, 758, 760.
  on physical degeneracy, 142.
  on prevention and cure of dental caries, 70.
  on professional fees, 938.
  on treatment of pulpless teeth, 863.
  operation under guaiacol-cocain cataphoresis, 48.
  report of Committee on Practice to New York State Dental Society, 940.
Rheostats, forms of, 214, 329, 941.
Rheumatism, uric-acid theory of, 945.
Rich, J. B., on contour fillings, 599.
  on dental education, 681.
  on dental museum and library, 692.
  on milk of magnesia, 770.
Richards, W. H., method of loading rubber plates with fusible metal, 423.
  on dry sockets, 929.
  on morphology of the pulp, 1014.
Richardson, B. W., on voltaic narcotism, 226, 703.
Richmond hot-air syringe, 139.
Riggs, J. M., treatment of pyorrhea, 882, 884.
Risus sardonicus, 837.
Robbins, J. B., opening prayer at Southern Dental Association, 61.
Roberts, H. E., on tooth-bleaching, 149.
Robinson, J. A., new bite-lock, 709.
Rodentia, facial muscles of, 839.
Roentgen ray, experiments with, 401, 481.
Root-canals, drying of, 142, 148.
  filling of, 165, 374, 555, 755, 832.
  opening of, 194, 201, 207.
Root-filling, Dr. King's investigations on, 651.
  molecular attraction in, 379.
Röse, C., on density of gold, 334.
Rosser, C. V., on artificial dentures, 583.
  on effect of diseased teeth on the general health, 571.
Rowan's gold, test of fillings, 304.
Roy, M., "Manuel du Chirurgeon Dentiste," review of, 1039.
Royal College of Surgeons of England, new regulations of, 873.
Royal College of Dental Surgeons of Ontario, commencement of, 517.
Royce, W. E., method of porcelain filling, 695.

Royce's pluggers, 731.
Rubber, management of in vulcanizing, 378.
Rubber-dam, use of in alveolar abscess, 193, 239, 242.
  use of in root-filling, 206.
Rubber polishing-cup, use of as electrode, 943.
Ruhmkorff coil, production of X ray by, 481.
Runschenbach, R., "Siegfried's Regulating Spring," 497.
Rush, R. A., on cast fillings, 857.

SACHS, W. E., method of porcelain filling, 696.
St. Louis Dental Society, officers for 1896, 174.
Salisbury, J. H., tests of teeth for calcic deposits, 313, 662.
Saliva, bactericidal properties of, 800, 809, 813.
  function of in protection of the oral cavity, 806.
  reaction of, 421.
Salivary calculus, P. D. Greene on, 1025.
  discussion on, 1026.
Salmon, I. A., obituary of, 1040.
Salol in treatment of devitalized teeth, 373, 380.
Salt, injurious effects of on teeth, 67.
Samoan Islands, abnormal cast from, 66.
San Francisco Dental Association, action on death of Dr. Garretson, 177.
  officers for 1896, 174.
Sanarelli, researches on the saliva, 800.
Sanguine temperament, characteristics of, 632, 634, 918.
Saprophytic bacteria of the mouth, 798.
Schleich, C. L., anesthetic compound, 562, 609, 878.
Schofield, A. J., gold filling furnished for test, 304.
Schreier's preparation in pulp-treatment, 194, 831.
  in tooth-bleaching, 149.
Schroeder, A. R., "Health Notes for Young Wives," review of, 443.
Schwarze, Dr., studies in articulation, 574.
Scientific work in dentistry, 787, 1033.
Scott, A. M., "The Treatment of Oral Acidity, Local and Systemic," 420.
Scurvy, bacillus of, 799.
Second District Dental Society, monthly meeting of, 234.
Secondary dentine, tooth-preservation by, 85.
Secret preparations in dentistry, 87.
Secreting papillæ of enamel, 477.
Seiler's antiseptic tablets, 630.
Senn, N., on migrated teeth, 587, 589.
Sensitive dentine, milk of magnesia in, 770.
  treatment of by cataphoresis, 49, 135, 222, 331, 403, 405.
Sensitive plates for skiagraphs, 485.
Separators, new forms needed, 371.
Serum pathology, development of, 340.
Sharp, W. M., artificial palate, 154.
  clinic by, 1028.
  on porcelain-work, 153.
Shell cusps for crown- and bridge-work, 732.
Shepard, L. D., on Dental Protective Association, 354.
Shields, L. N., obituary of, 707.
Shields, N. T., on root-filling, 165, 845.
Shot method for making metal dies, 647.
Shrinkage of amalgams, 44.
Shriver, F. M., on making metal dies, 647.
  process of attaching porcelain facings, 655.
Shryock, W. W., gold crowns for deciduous teeth, 391, 392.
Sibley, F. L., on diagnosis of pyorrhea alveolaris, 88.
Siegfried's regulating spring, R. Runschenbach on, 497.
Silver nitrate as a dental obtundent, 89, 370.
  as a lining for root-canals, 755.
  use of in pyorrhea, 883.
Silver-tin amalgam, G. V. Black on, 965.
  ageing of alloys in, 43, 965.
Skiagraphy in dentistry, 529.
Skill as a factor in filling-operations, 325.
Skull, methods of measurement, 35.
Slater, F., "Care of Children's Teeth," 647.
  on root-filling, 652.
Sleep as a curative agent, 511.
Smith, B. B., on dentistry and medicine, 251.
  on structural changes of teeth, 419.
Smith, B. H., on anatomy of the antrum, 949.
  on dental history, 783.
  on dentistry and medicine, 247, 251, 252.
  on gold fillings, 586, 600.
  on prosthetic dentistry, 63.
  on silver nitrate in root-canals, 758.
  on treatment of cysts, 594.
Smith, C. C., obituary of, 790.
Smith, D. D., on pulp-capping, 265.
  on pyorrhea alveolaris, 346.
Smith, E. H., address by, 700.
Smith, F. M., "How shall we Make our Local Societies more Attractive and Helpful?" 723.
  case of infantile scorbutus, 66.
Smith, S. E., heroic treatment for pain following tooth-extraction, 931.
Söderberg, T., method of pulp-treatment, 374, 375, 556, 651.
Sodium dioxid as a bleaching agent, 149.
  in pulp-treatment, 145.
Sodium peroxid in pulp-treatment, 374.
  used dry, 449.
Soft gold as an antiseptic, 159.
  physical properties of, 326.
Soft teeth, A. Knight on, 792.
Solder for platinum and porcelain, 265.
Solila gold, 165.
South Carolina State Dental Association, annual meeting of, 359.
South Dakota Dental Society, annual meeting of, 438.
Southern Dental Association, annual meeting of, 61, 154, 246, 414, 523, 850, 926, 1007.
  proposed union of with American Dental Association, 354, 850, 1011, 1022.
Sozo-iodol as an antiseptic, 738.
Space-guards for filling deciduous teeth, 553.
Spalding, C. W., obituary of, 706.
"Spatter tubes," 484.
Specialism in dentistry, 640, 643, 859.
Specialties in medicine, 253.
Species, variation of, 630, 899.
Spee, Prof., on development of enamel, 504, 505.
Speech, restoration of by mechanical appliance, 561.
Spencer, H. C., "A New Device in Crown- and Bridge-Work," 732.
Sphincter muscles, 835.
Splint for implantation cases, 188.

Sponge-grafting in pyorrhea, 885.
Sponge-holder, Bryan's, 164.
Spray apparatus for antral disease, 949.
Spring appliances for regulating, 498.
Stack, R. T., on touch bulbs in dentine, 875.
Staining agents for dentine and enamel, 471, 748, 812.
Starr, E. T., articulator of, 581.
State dental meetings, decline of, 564.
Stearns, G. O., obituary of, 264.
Stebbins, E. A., introduction of silver nitrate in dental practice, 370.
  obituary of, 1041.
Stedman bridge litigation, 354.
Stellate reticulum of enamel-organ, 104, 287, 506.
Stellwagen, T. C., acknowedgment to, 2.
  method of filling root-canals, 759.
  on bacteriology, 923, 925.
  on dental nomenclature, 1024.
  on treatment of antral diseases, 171.
Stephan, J. L., on silver nitrate in root-canals, 758.
Stephens, B. L., on root-filling, 653.
Stevens, G. T., on dentistry and medicine, 247.
Stevenson, Dr., on the teeth in relation to temperament, 658.
Stocken, J., "Dental Materia Medica and Therapeutics," review of, 179.
Stomatitis and throat-diseases, I. Lett on, 734.
Stomatitis, potassium chlorate in, 384.
Stomatological courses in medical schools, 249.
Stowell, S. S., "The Law of Prevention *vs.* the Law of Cure," 54.
  caution in use of pyrozone, 1045.
  dental anomalies, 66.
Stratum intermedium, development of secretive papillæ in, 477, 501, 889.
Striations of enamel, 454, 474.
Students, illegal practice by, 845.
Success, essentials of, 176.
Suction-plates, first use of, 181, 265.
Sudduth, W. X., "Modern Methods of Treating the Maxillary and other Sinuses of the Cranium," 736.
  on enamel-formation, 101, 276, 287, 454.
Sulfur, melting point of in mercury compound, 728.
Sulfuric acid, action of electric current on, 411, 753.
  as a bleaching agent, 149.
  as a dental obtundent, 90, 221, 234.
  in pulp-treatment, 194, 204, 507, 555, 831.
  use of in pyorrhea, 885.
Surgery, antisepsis in, 923.
  early methods in, 720.
Surgical engine, demonstration of, 850.
Sutphen, H. S., gold filling at clinic, 233.
Suturing, new method of in cleft-palate operations, 601.
Sweeny, A. W., "Dental Legislation," 846.
  obscure cases in practice, 513.
  on dental education, 679.
  on pulp-treatment, 652.
Synovitis, hot-water treatment of, 931.
Syphilis, influence of on development of the teeth, 419.
  origin of, 901.
Systemic treatment of dental diseases, 385, 782.

TABES dorsalis, influence of on disorders of the teeth, 349.
Tacoma College of Dental Surgery, commencement of, 784.
Taft, J., on silver nitrate in root-canals, 759, 761.
  on dental nomenclature, 1024.
  report on necrology, 353, 1024.
Taggart, W. H., claims to priority of electric oven, 353.
Talbot, E. S., "Pyorrhea Alveolaris," 310, 660.
  editorial comments on, 359, 612.
  "Teeth Irregularities and their Surgical Correction," 907.
  on antral diseases, 739.
  on articulation of teeth, 582.
  on effect of diseased teeth on the general health, 572.
Tartar, removal of in pyorrhea, 883.
Tartarlithine in pyorrhea, 496.
Taylor, J., honors to memory of, 530.
Tears, bactericidal action of, 799.
Technic teaching, advantages of, 93, 172.
Teeth, L. Jack on plantation of, 185.
  bleaching of, 148, 217, 404, 877, 941, 961.
  development of, 102, 168.
  devitalized, treatment and filling of, 373.
  devitalization of for bridge-work, 205.
  effect of dehydration on, 143, 145, 147.
  electrical action in, 77.
  imbedded in antrum, 17.
  implantation and replantation of, 130, 239, 243, 771, 1014.
  indiscriminate extraction of, 844, 859.
  local exercise of, 71.
  migration of, 586.
  occluding cusps of, 34.
  of the poor, care of, 385.
  physical properties of, 296, 333.
  regulation of, 497, 907.
  relation of to temperament, 630, 658, 919.
  separation of in filling-operations, 596.
  skiagraphs of, 482, 483.
  specimens requested for microscopic study, 210.
  structural changes in, 414, 417, 418, 792.
Temperament, H. H. Burchard on, 841.
  J. P. Gray on, 917.
  A. H. Thompson on, 630.
  as a factor in pulp-treatment, 141, 160, 862.
  classification of, 631.
Temperature, influence of on amalgams, 969.
  registration of in vulcanizers, 728.
Teratoid tumors, 588.
Tesla, N., experiments with the X ray, 481, 486.
Test fillings, resistance to stress by, 334.
Texas Dental Association, annual meeting of, 436.
Text-books, premature indorsement of, 464. 868.
Thackston, W. H. H., letter from, 850.
Thayer, W. I., on infant foods, 68.
Therapeutics in dentistry, 251.
Third molars in artificial dentures, 41.
Thomas, G. R., on dentistry and medicine, 247.
Thomas, J. D., on nitrous oxid and oxygen, 136, 952.
Thompson, A. H., "A Plan for a National Dental Association, divided into Four Co-ordinate District Branches," 562, 642.
  Reply to Dr. H. H. Burchard, 1004.
  "The Variations of the Teeth in Relation to Temperament," 630, 841.
  on anatomy of the antrum, 170, 657.

Thompson, A. H., on care of children's teeth, 648.
 on dentistry and medicine, 248.
 on heredity, 645.
Thompson, H. C., case of periostitis, 690.
 on dermoid cysts, 592.
 on methods of filling, 585, 600.
 on milk of magnesia, 770.
 report on anatomy, 687.
Thompson, J. S., case of throat-trouble due to diseased teeth, 571.
 on artificial dentures, 583.
 on pulp-capping, 156.
Throat-diseases, relation of to stomatitis, 734.
Thymol as an antiseptic, 375.
Tibbetts, C. J., "Orthodontia," 643.
 on care of children's teeth, 648.
Tibbetts, T. E., gold filling at clinic, 233.
Time system of fees, 823, 935, 939.
Timme, C. A., method of drying pulp-canals, 142.
Tin as a filling-material, 602.
Tissue resistance to cataphoresis, 411.
Tissues, preparation of for microscopical work, 745.
Tobacco, effect of on the teeth, 347.
Tomes, C. S., confirmation of Dr. Black's studies on tooth-structure, 208.
 on enamel-structure, 453, 471, 505.
 on the physiology of dentine, 876.
Tomes, J., on enamel-formation, 101.
Tomes processes of enamel, 276, 505.
Tong electrode for cataphoresis, 329, 330, 406.
Tonsillitis, breath-disorders from, 628.
Topics for society discussion, 91.
Touch bulbs in dentine, 875.
Transillumination in treatment of antral diseases, 737, 738.
Trephine for treatment of cysts, 594.
Trichloracetic acid, uses of, 355.
Trismus, irritative or reflex, 58.
Tropacocain as a local anesthetic, 87.
Trueman, W. S., "The Advent of Dental Science in the United States," 713.
 on pyorrhea alveolaris, 344, 448.
 solder for platinum and porcelain, 265.
Truman, J., on acid reaction of the buccal mucus, 807.
 on germicides, 901.
 on nitrate of silver in root-canals, 758, 760.
 on pyorrhea alveolaris, 348.
 on use of coagulants in root-canals, 833.
Tubercular pyorrhea, case of, 496.
Tumors, causation of, 588.
 treatment of by cataphoresis, 409.
Turner, V. E., on dental education, 253.
 on use of the mouth-mirror, 1011.
Turner, W. J., gold fillings furnished for test, 304.
Typhoidal pyorrhea, case of, 496.

UNGULATA, facial muscles of, 839.
University College of Medicine, Dental Department, commencement of, 606.
University of Buffalo, Dental Department, commencement of, 522.
University of California, Department of Dentistry, commencement of, 785.
University of Iowa, Dental Department, commencement of, 432.
University of Maryland, Department of Dental Surgery, commencement of, 434.
University of Michigan, Dental Department, commencement of, 785.
University of Pennsylvania, Department of Dentistry, commencement of, 607.
Uric acid, technique of tests for, 526, 611.
Uric-acid theory of pyorrhea, 945.

VACUUM tubes, early forms of, 479.
Vagina, microbes of, 799.
Van Vleck, C. K., on porcelain inlays, 932.
Van Woert, F. T., battery of, 960, 961.
 extemporized tooth-crown, 793.
 gold fillings furnished for test, 304.
 on cataphoresis, 565, 942.
 on replantation of teeth, 239.
 on sulfuric acid as a dental obtundent, 234.
Vance, W. W., "Electricity and Its Uses in Dentistry," 653.
Vanderbilt University, Dental Department, commencement of, 432.
Varicosities of enamel-rods, 469.
Varnishing in contour work, 604.
Vegetation, effect of climate on, 924.
Vermont Dental Examining Board, annual meeting of, 175.
Vermont State Dental Society, annual meeting of, 256.
 officers for 1896, 437.
Vetter rheostat, 214.
Virginia State Dental Association, action on death of Dr. Gingrich, 178.
Vital force in nature, 77, 81.
Voltaic narcotism, 703, 704.
Von Ebner on enamel-structure, 455, 473.
Vulcanite, C. A. Allen on, 727.
Vulcanizing, improved method of, 376.

WADSWORTH, E. C., obituary of, 179.
Wadsworth, H. N., obituary of, 1039.
Walker, F. C., gold fillings furnished for test, 304.
Walker, W. E., "Movements of the Mandibular Condyles and Dental Articulation," 573.
 "Ought the Dentist to be a Graduate in Medicine?" 246.
 "Prosthetic Dentistry; the Glenoid Fossa; the Movements of the Mandible; the Cusps of the Teeth," 34.
 case of rapid decay of the teeth, 418.
 new articulator, 426, 581.
 on pulp-capping, 159, 162.
 on pyorrhea, 678.
Walker, W. W., clinic report by, 393.
 offers resolution establishing Dwinelle clinic, 510.
 on porcelain inlays, 933.
 on professional fees, 937.
Walker-Bonwill articulator, 38, 426.
Walton, J. C., "The Fate of Associations," 638.
Washington City Dental Society, officers for 1896, 174.
 annual meeting of, 583, 679, 767.
Washington State Dental Society, annual meeting of, 434, 843.
Wassall, J. W., "The Disinfection of Pulpless Teeth," 829.
Wasson, L. C., "Co-operation," 655.
Water as a local anesthetic, 610.
Waters, T. S., on dental hygiene, 777.
 on treatment of pulpless teeth, 845.
Watkins, S. C. G., on eucaine and ammonol, 1006.
 impression-taking at clinic, 233.
 on pulp-capping, 163.
 on kreosotum, 419.
Watt's crystal gold, test of fillings, 304.

Wax as a permanent filling for root-canals, 760.
Webb, A. T., method of porcelain filling, 696.
Wedge-cutter, Palmer's, 1024.
Weeks, T. E., on cataphoresis, 736.
Wells, A. B., obituary of, 446.
Wells memorial, action on by American Dental Association, 352.
Wesener, J. A., tests of teeth for calcic deposits, 313, 526, 612, 662.
West, T. C., on treatment of children's teeth, 417.
  paper read by, 246, 254.
West Virginia State Dental Association, annual meeting of, 1033.
Western Dental College of Kansas City, commencement of, 519.
Western Reserve University, Dental Department, commencement of, 608.
Westlake, A. C., cataphoric experiments of, 133, 219.
Westmoreland, W. W., articulator of, 581.
  on dentistry and medicine, 250.
Wheat, proper grinding of for food, 57, 69.
Wheeler rheostat, 214, 228, 230, 329, 409, 877.
White decay, treatment of, 768.
White, J. D., obituary of, 95, 363.
White, J. W., on dental education, 249.
  on the study of temperaments, 636, 917, 921.
White, S. S., Dental Mfg. Co., action of directors on death of S. R. Bingham, 263.
  action of Chicago branch house on, 263.
  alloys for tests, 45.
  velvet gold, test of fillings, 304.
White, W. H., on Balsamo del Deserto, 156.
Whitmarsh, H. D., reads Dr. McAlpin's paper, 151.
Whitney, J. M., on teeth of the Sandwich Islanders, 899.
Wiber, D. E., "Cysts; their Treatment by Curetting," 592.
Wilbur, W. C., on salivary calculus, 1026.
Williams, J. L., "A Reply to Dr. Andrews," 887.
  "On the Formation and Structure of Dental Enamel," 101, 269, 453.
  comment on by Dr. Andrews, 957.
  request for sections for microscopic study, 208.
  reply to International Dental Journal, 866.
Williams, R. S., obituary of, 533.
Williams's cylinders, test of fillings, 304.
Wilson, H. D., "Professional Congeniality," 572.
Wilson, F. N., removal of nævus under cataphoresis, 51.
Wilson, I. P., report on histology and microscopy, 167.
Wilson, Mr., "A So-called Abnormal Form of the Jaw," 657.
Winkler, G. H., "Medicinal Prevention of Dental Caries," 381, 419.
Wire sutures for treatment of jaw-fracture, 840.
Wisconsin Examining Board, Eleventh Annual Report, notice of, 98.
Wisconsin State Dental Society, annual meeting of, 524.
Witthaus, C., "Left-Cutting Burs," 557.
Witzel's paste, use of in root-filling, 374.
Witzel's solution for treatment of pyorrhea, 883.
Woman's Dental Association of the United States, monthly meeting of, 173, 428, 516.
Women in dentistry, 781.
Woodbury, E. I., "Making Metal Dies Direct from Impression," 646.
  on soft gold, 659.
Wooden toothpicks, use of in filling root-canals, 759.
Woodworth, F. J., "Local Anesthesia and Obtundents," 88.
Wright, A. M., on porcelain inlays, 933.
Wright, G. F. S., on dental hygiene, 417.
  on dry sockets, 930.
  on gold foils, 158.

X RAY, dental applications of, 478, 529, 941, 1012.

YOUNG, R. C., "Can the Dentine be Reached through Systemic Treatment?" 414.
  on copper amalgam, 161.
  on pulp-capping, 162.
Younger, W. J., implantation under cataphoresis, 49.
  method of regulating with silk cord, 234.
  on alveolar abscess, 238.
  on implantation of teeth, 243, 244, 245.
  on pyorrhea, 571, 676, 677, 678, 882.
  priority of in implantation, 186.

ZINC, modification of silver-tin amalgam by, 988.
Zinc chlorid as a coagulant, 758, 832.
  cataphoric application of, 944.
Zygomatic muscles, function of, 837.
Zymotic diseases, bacterial origin of, 925.

ALLPORT'S

Registering Dental Ledger.

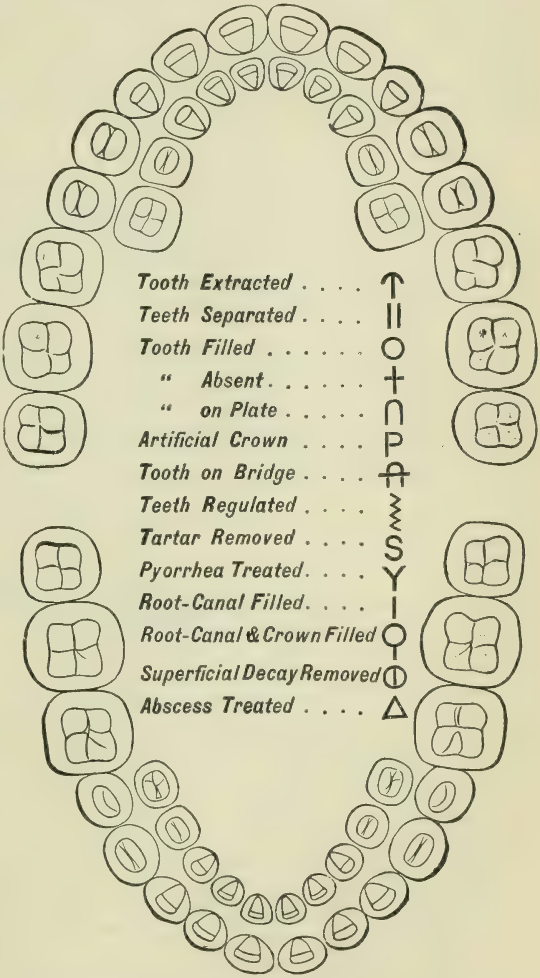
CHANGES IN THE SYMBOLS.

The rapid progress in dental practice has made necessary several changes in the symbols indicating special operations.

As now arranged, the dentist will be able to make a complete record of his work by marking the teeth operated upon with the appropriate figure, as shown in the diagram, of which there are two on each page. Between these there is space ruled for name of patient, reference, date of operation, charges, and credit for amounts paid.

For twenty-five years the Allport's Ledger has held the highest place in the estimation of the dental profession; it needs no other recommendation.

These books are in three styles, made on good paper and substantially bound.



Tooth Extracted	↑
Teeth Separated	‖
Tooth Filled	O
" *Absent*	+
" *on Plate*	∩
Artificial Crown	P
Tooth on Bridge	₳
Teeth Regulated	⌇
Tartar Removed	S
Pyorrhea Treated	Y
Root-Canal Filled	I
Root-Canal & Crown Filled	⫯
Superficial Decay Removed	⦶
Abscess Treated	Δ

PRICES.

340 Pages, Half Turkey, Cloth Sides	$3.50
340 " " Roan, Paper "	3.00
172 " " " " "	2.00

Dentists' Pocket Diary and Appointment Book,

FOR

REGISTERING APPOINTMENTS FOR DENTAL OPERATIONS.

MONDAY. 18

8		1	
9		2	
10		3	
11		4	
12		5	

TUESDAY.

8		1	
9		2	
10		3	
11		4	
12		5	

WEDNESDAY.

8		1	
9		2	
10		3	
11		4	
12		5	

The above Diagram shows the exact size and style of a page of the Pocket Diary, presenting, when open, engagements for one week. The figures denote the hour of the engagement. It contains blanks for 54 weeks, and, being without date, is good for any time. It has also a neat memorandum attached.

Flexible Cover, Gilt Edge	$0.75
" " " " with Pocket and Tuck . . .	1.00

THE MEREDITH
POCKET DENTAL ACCOUNT BOOKS.

Being carried in the pocket, the Meredith Pocket Dental Account Books are always at hand when wanted for recording an appointment or operation. The various books of the series are very nicely adapted for their particular use. The space is economically used. Operations on the temporary teeth may be recorded without danger of mistake, and each operation having a space and diagram of its own cannot be mistaken for one performed at some other time.

There are three books in the series :

The Pocket Dental Register and Appointment Book

contains 224 pages, divided as follows : 120 pages for small accounts, ten to the page, each supplied with a diagram for locating operations ; 24 pages for medium accounts, two to the page ; 16 pages for larger accounts, one to the page ; 16 pages with ten accounts to the page for operations on the temporary teeth ; 32 pages for appointments, twelve days to the page (sixty-four weeks), good for any time ; and 16 pages for memoranda.

For dentists of small practice this book supplies all the requirements.

The Pocket Dental Journal and Appointment Book,

Designed for use as the day-book and journal of the merchant, for recording the operations of the day as they are completed, which are afterward to be posted to a ledger. There are 176 pages with ten blanks to the page ; 8 pages for operations on temporary teeth ; 32 pages for appointments, and 8 pages for memoranda. It may be used in connection with any of our dental ledgers, or with

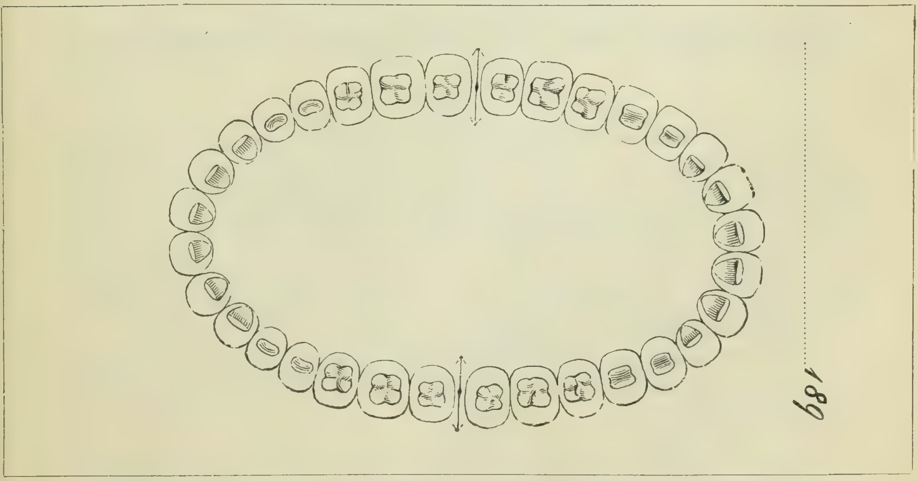
The Pocket Dental Ledger and Appointment Book,

Made up principally of the large and medium blanks used in the Register, and therefore to be used more especially as a Ledger or condensed statement of the work recorded in the "Journal." It has 96 pages for medium accounts, two to the page ; 72 pages for large accounts, one to the page ; 8 pages for operations on temporary teeth ; 32 pages for appointments ; and an ample index and pages for memoranda.

Prices uniform for all the above.

Cloth	$1.25
Leather, with Tuck	1.50

MEMORANDUM BLANKS.

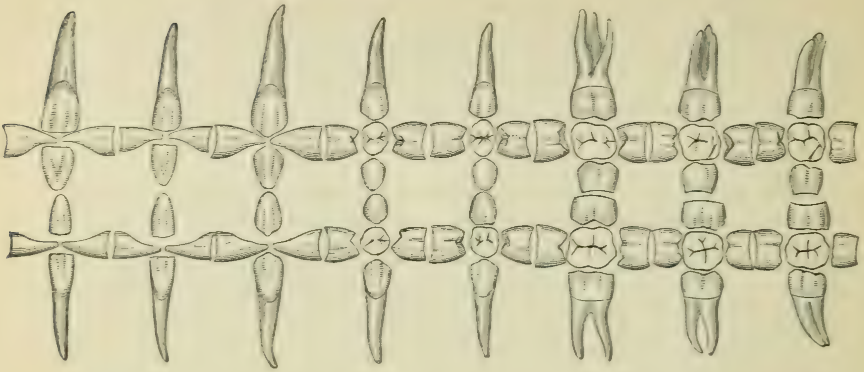


The size and style are shown by the diagram. Plain backs. 100 in a tablet.

Price . . . . per tablet 20 cents.

AINSWORTH'S DENTAL LEDGER.

Devised by Dr. Geo. C. Ainsworth.



The diagram which Dr. Ainsworth uses (of which one side—the left—is shown) permits an operation on any portion of any crown to be so plainly indicated that there can be no mistaking its exact location. The pages are 9¼ x 11½ inches, made up into books of 200 and 396 pages. The smaller books are bound in half Russia, cloth sides; the larger are full bound, with Russia corners—regular ledger binding.

A proportionate number of the pages in each style is ruled for one, two, and three accounts to the page, each account having a separate diagram. The index is interleaved with blotter.

PRICES.

Half Russia, 200 pp.	$3.50
Full Bound, 396 pp.	6.50

GRIFFITH'S

Appointment Book and Emergency Compendium.

By J. F. Griffith, D.D.S.

Dr. Griffith offers a new and convenient form of Appointment Book, to which is appended a collection of useful hints bearing on emergencies, and information on general practice not at every dentist's finger-ends.

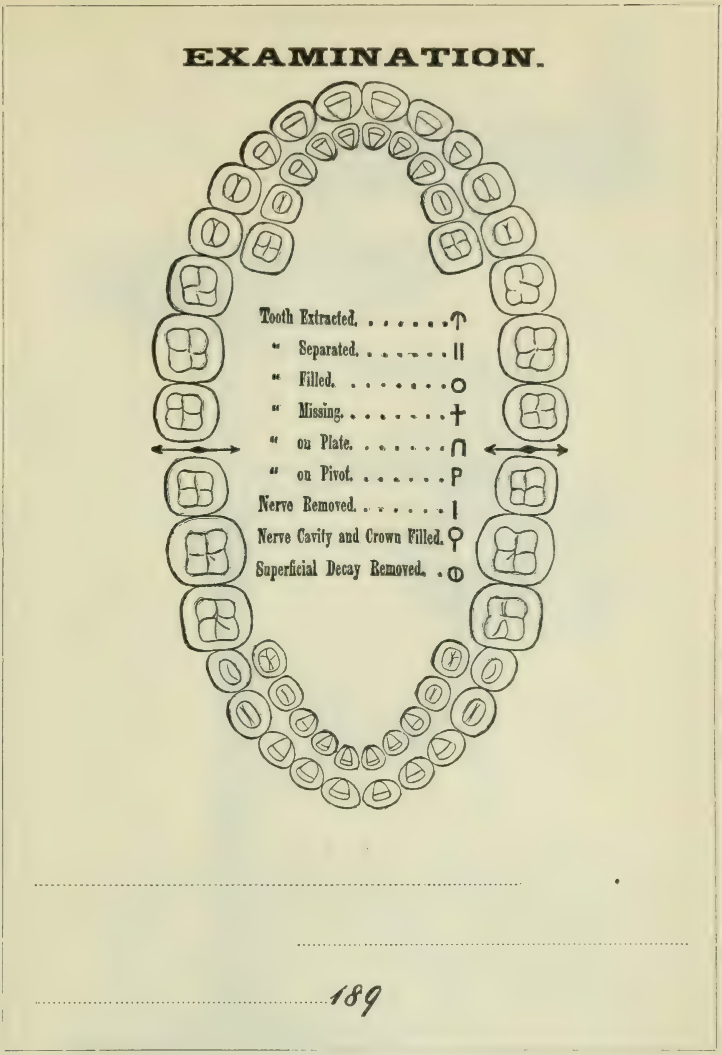
In the Appointment pages, of which there are sufficient for fifty-five weeks, the left-hand page as the book is opened is for appointments, three days with ample space for eight appointments to the day, being arranged for on each. The opposite page is for memoranda. The hours of forenoon and afternoon appointments are entered in separate columns.

The book is neatly bound in leather, with aluminum stamp and gilt edges. Two styles, plain, and with fold-over flap, pocket, and pencil-holder. Made for pocket, of course.

PRICES.

Leather, plain	$1.00
Leather, with flap, pocket, and pencil-holder	1.25

EXAMINATION BLANKS.



EXAMINATION.

Tooth Extracted. . . . . . . ↑
" Separated. . . . . . . ||
" Filled. . . . . O
" Missing. . . . . †
" on Plate. . . . . . . ∩
" on Pivot. . . . . . . P
Nerve Removed. . . . . . . |
Nerve Cavity and Crown Filled. ♀
Superficial Decay Removed. . ⦶

....

....

....189

The reverse side of these Examination Blanks is prepared for memorandum accounts. Size 5⅜ x 3¾ inches. Put up in tablets of 50 each.

Price . . . . per tablet 20 cents.

DENTISTS' BILL-HEADS.

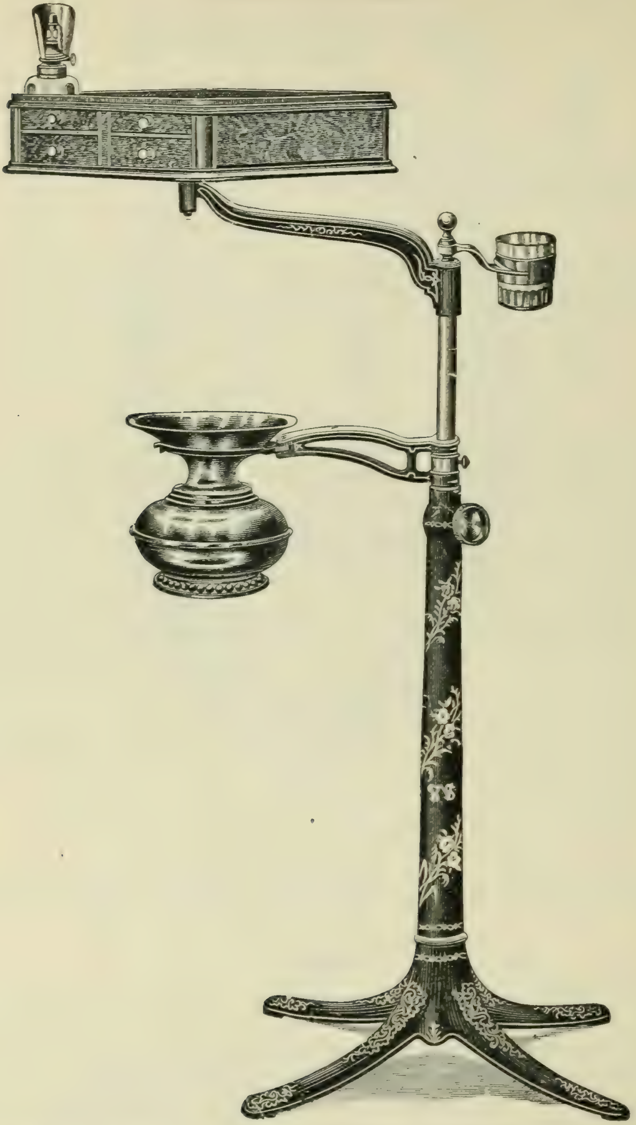
PUT UP IN TABLETS OF 100.

PRICES.

No. 1	per hundred 60 cents.
" 2	" " 30 "
" 3	" " 60 "
" 4	" " 60 "

The S. S. White Portable Tool-Tray and Spittoon Stand.

Patented December 5, 1876.



This Stand, as now made, comprises the most valuable features of the former makes of the S. S. White and Johnston Stands.

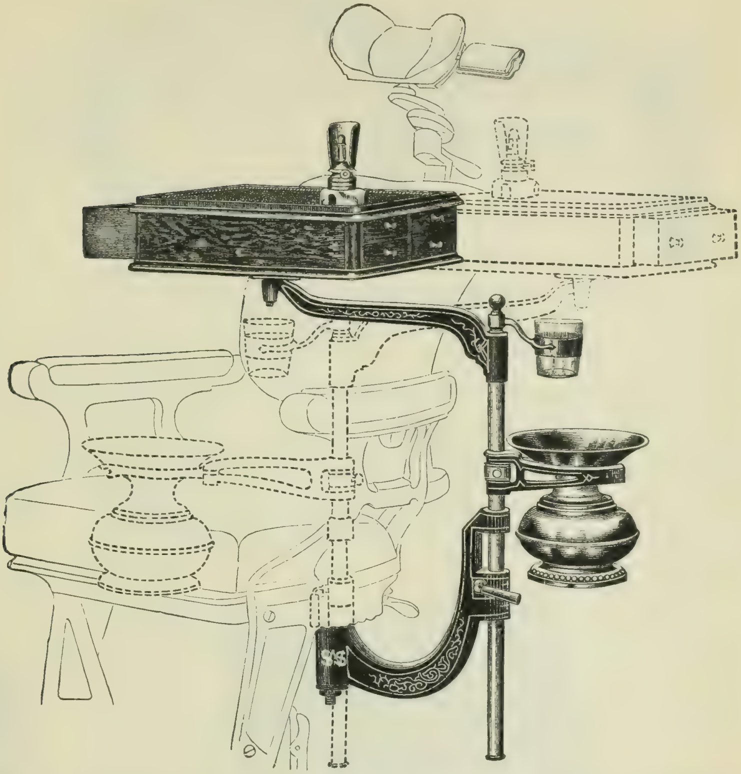
PRICES.

Portable Stand, complete, with Holmes Table . . .	$53.00
" " " " Glass-side Allan Table .	38.00
" " " " regular Allan Table . .	35.00
" " " " Imitation Rosewood Table	29.00

BOXING FREE.

Combination Dental Chair Attachment.

Patented November 20, 1877.



All the best features of several devices which we formerly manufactured are comprised in this Attachment, making it, so far as we can now see, a perfect combination Tool-Tray, Spittoon-carrier, and Tumbler-holder.

A curved swinging crane pivoted to the left trunnion-arm of the chair carries an upright standard rod or support. At the top of the rod is a swinging tumbler-holder, and immediately below it the tool-tray bracket-arm. The tool-tray is attached to the arm by a socket, which gives the tray a horizontal pivoted movement. The spittoon-bracket has a vertical range upon the standard of twelve inches, and swings freely around it. It is provided with a spittoon-holder similar to that of our No. 2 Spittoon-Bracket, and the arm is curved conveniently to allow the spittoon to be flung out of the way when desired. The standard has a vertical range of twelve inches, and is held securely at any point by a clamp-block in the swinging crane. This, with the various adjustments of the auxiliary parts, permits an almost unlimited choice of positions, some of which are shown by the dotted lines in the cut.

This Attachment is made in the best manner, and finely finished, the bright parts nickel-plated. Adapted to the Improved Wilkerson Dental Chairs.

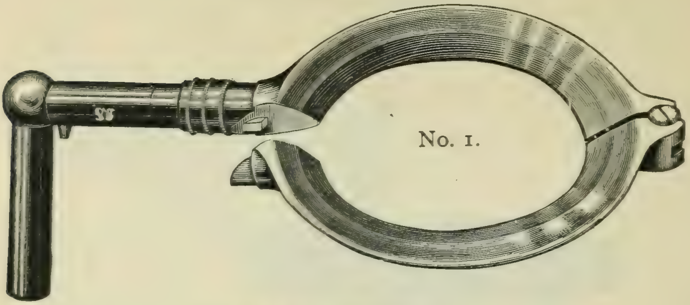
PRICES.

Complete, with Holmes Table and No. 4 Spittoon . . .	$49.00
“ “ Allan “ Glass Sides and No. 4 Spittoon	34.00
“ “ “ “ and No. 4 Spittoon (see cut) .	31.00
“ “ Imitation Rosewood Table and No. 4 Spittoon	25.00

Other spittoons may be substituted at value (see page 10).

BOXING FREE.

SPITTOON BRACKET No. 1.



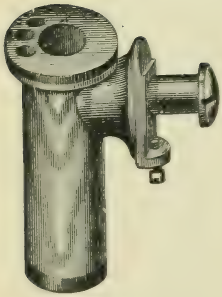
BRACKET No. 1

Is an improvement on our former Closed-Ring Bracket. It is much heavier and stronger throughout. The hinged joint and the locking device with projecting support are very valuable features. This is decidedly the best Spittoon-Bracket ever placed on sale, and any one desiring a well-finished, strong, and durable device for holding a spittoon will find it in this Bracket.

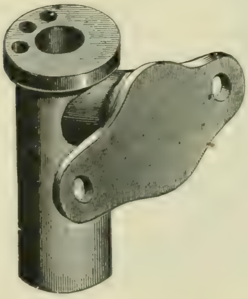
Made of Brass, Nickel-plated.

Price, without Socket $5.50

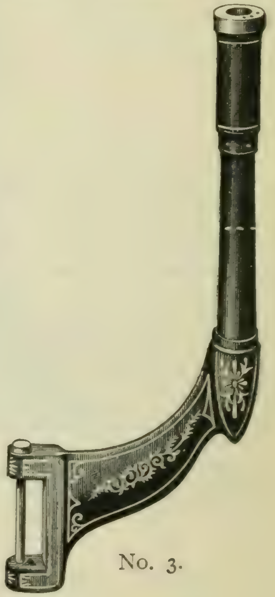
SOCKETS.



No. 1.



No. 2.



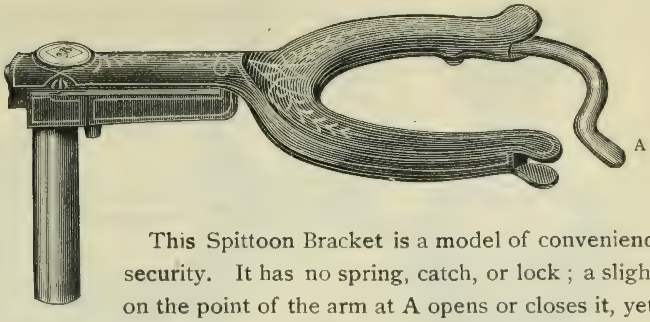
No. 3.

PRICES.

No. 1, for Wilkerson and Pedal-Lever Chairs . .	each	$0.50
" 2, for Wood-frame Chairs	"	.50
" 3, for Morrison Chairs	"	1.50

SPITTOON BRACKET No. 4.

Patent applied for.

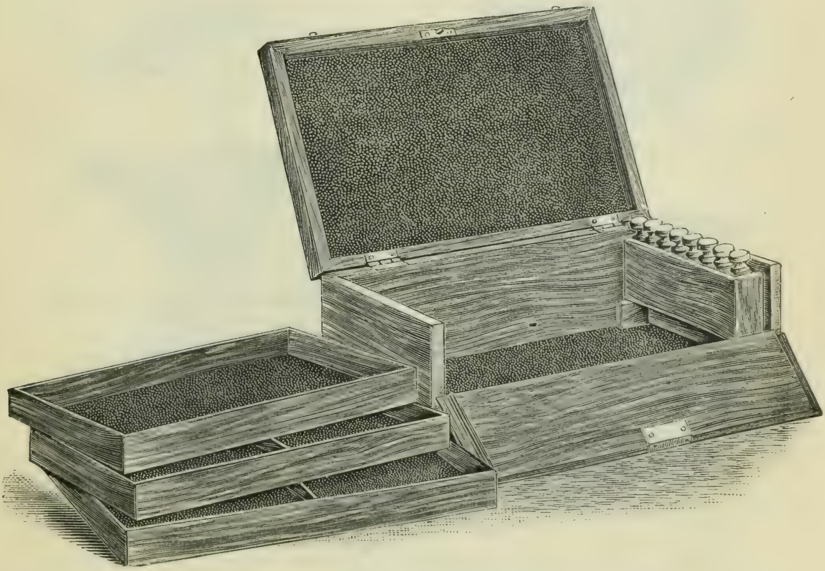


This Spittoon Bracket is a model of convenience and security. It has no spring, catch, or lock ; a slight push on the point of the arm at A opens or closes it, yet there is no possibility of accidental opening. It is made in our usual style, japanned and neatly ornamented.

The Bracket will take either of our Spittoons, and is adapted to Sockets Nos. 1, 2, and 3.

Price $2.50

STUDENT'S CASE "D."

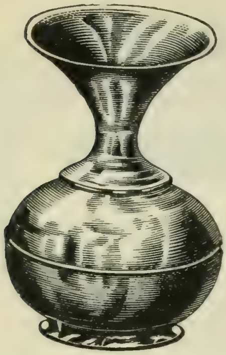


Made of walnut, lined with cotton velvet. Outside dimensions, 14 inches long, 9½ inches wide, 6 inches deep. Lock and key. Contains three trays, two being divided in the center. At the end of the Case is a space with eight half-ounce square ground-stoppered vials.

Price, complete, with eight vials $6.00

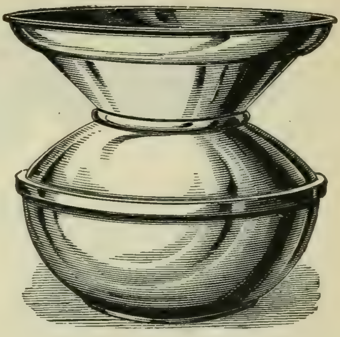
SPITTOONS FOR DENTAL CHAIRS.

No. 2.



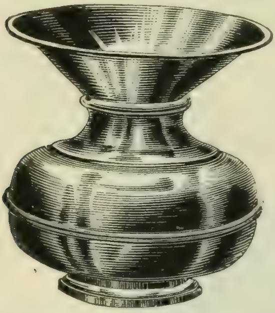
Made of heavy spun brass, finely Nickel-plated.

No. 3.



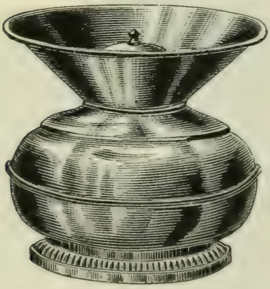
Made of brass, Nickel-plated.

No. 4.

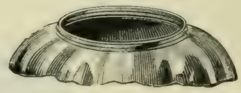


Made of spun brass, Nickel-plated, much lighter than No. 2.

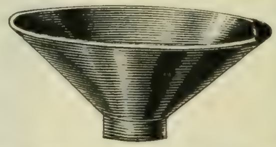
No. 5.



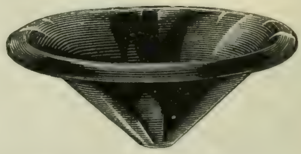
Made of light spun brass, Nickel-plated.



Section of No. 4.



Glass Funnel for Nos. 4 and 5 Spittoons.



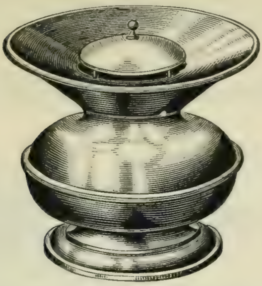
Glass Funnel for No. 2 Spittoon.

PRICES.

Spittoon No. 2, including Gold-Catcher	$9.00
" No. 3, " "	4.00
" No. 4, " "	4.00
" No. 5, with Cap	1.50
Funnels . . . each	.75

These Spittoons are seamed and soldered around the bodies, while those of all other makes brought to our notice are seamed only, and not soldered.

CUSPIDOR No. 6.



This Cuspidor is similar in general design to the No. 5, but in the essential qualities of weight of metal, finish, and workmanship it is very superior.

The No. 5 is not made in our factory, and while at the low price at which we have sold it, viz: $1.50, it has a very fair sale, there has been a demand for a higher finished and more durable article.

The No. 6, made in our own factory from selected material and where every step of the process is under rigid inspection, answers this demand.

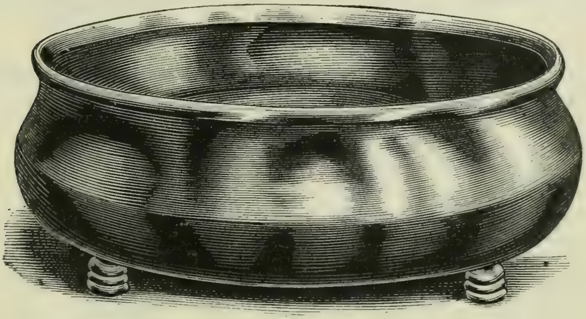
By making a great number of these, we are able to furnish them at the small advance of seventy-five cents above the price of the No. 5, and we do not doubt that the purchaser will be entirely satisfied that the extra cost is a good investment.

The No. 6 bears our trade-mark, which is always our guarantee of the best material, workmanship, and finish.

Price of the No. 6 Cuspidor	$2.25

HAND SPITTOONS.

Suggested by Dr. Isaac Douglas.

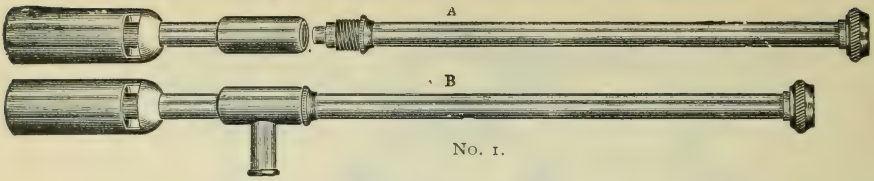


A very useful appliance during extraction under nitrous oxid or other operations under anesthetics, as it can be held close up to the chin of the patient. Made of stout brass, nickel-plated. Size, 2 inches deep, 6 inches in diameter. Dr. Douglas suggested the plain form as shown; the Spittoon is also made with a handle.

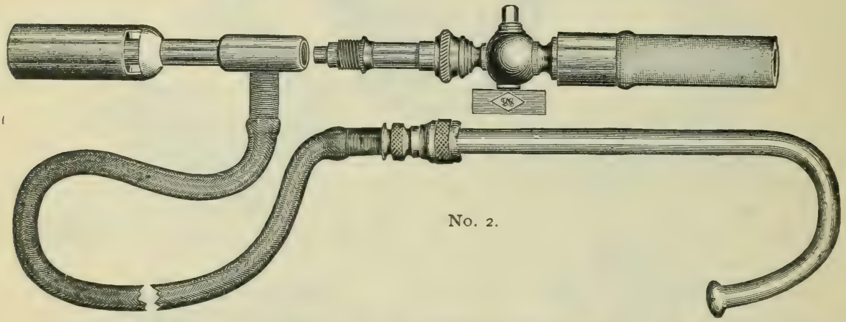
PRICES.

Without Handle	each	$1.30
With "	"	1.50

IMPROVED SALIVA EJECTORS.



No. 1.



No. 2.

No. 1 is the Ejector used on our Fountain Spittoon. The stem is attached by a screw-joint, affording opportunity to cleanse the parts when desired. A shows the Ejector in sections, and B complete.

No. 2, which operates precisely the same, can be connected by rubber tubing to any ordinary faucet, as of wash-basins. By the intermediate stop-cock the water can readily be turned on or off without disturbing the main flow.

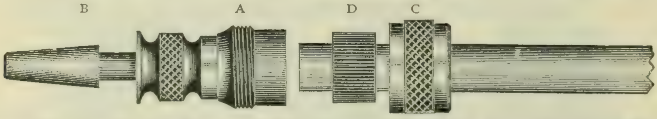
The Glass Tubes or Mouth-pieces supplied in Flint, Amber, Blue, or White. Unless otherwise specified, Flint is sent.

PRICES.

No. 1, with 4 feet Silk-covered Tubing and Glass Mouth-piece	$6.00
The same with 4 feet Plain Rubber Tubing	5.00
No. 2, with 4 feet Silk-covered Tubing and Glass Mouth-piece	9.00
The same with 4 feet Plain Rubber Tubing	8.00

Extra Glass Tubes for Saliva Ejectors, per doz. 50 cents ; each 5 cents.

Improved Connection for Saliva Ejector Mouth-piece.



Devised to facilitate the attachment of the glass mouth-pieces to Saliva Ejectors. The body A of the Connection is permanently fixed in the rubber tubing by inserting the shouldered nipple B and binding it firmly. The stem of the mouth-piece is then passed through the ferrule C and a washer D formed of a section of rubber tubing slipped over the end. The end of the stem with the washer is then placed in the body of the Connection and the ferrule screwed down, compressing the rubber washer to form a tight joint.

All our Saliva Ejectors are now supplied with the Improved Connection without extra charge. Cut shows parts actual size.

Price, Improved Connection . . . . . . 50 cents.

WATER PRESSURE IN FOUNTAIN SPITTOONS.

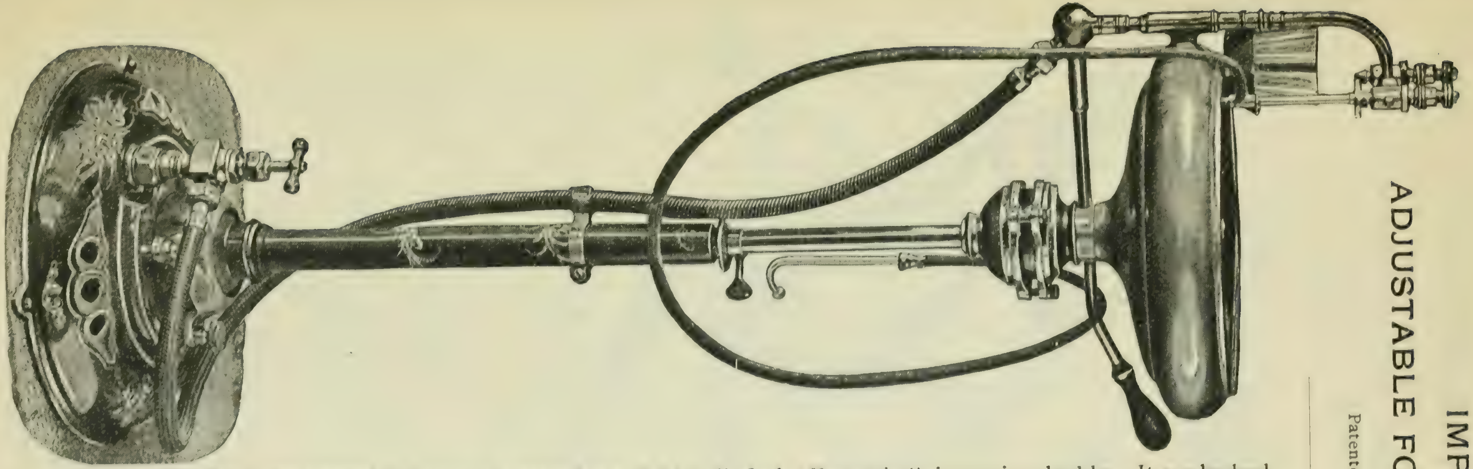
For supply and waste pipes we use the best silk-covered cloth-lined rubber tubing, which under a pressure of 120 lbs. gives no indications of strain. We are therefore sure it will stand a constant pressure of 60 pounds.

With a water pressure greater than 30 lbs. it would be well, after the attachments are made, to open the balloon jet in the center of the spittoon bowl before turning on the water. Then open the water-valve at the base gradually, to determine the exact pressure necessary to produce the proper flow from the jets. If not so regulated, the excessive pressure on the balloon jet will cause a spattering of the water over the edge of the bowl.

☞ Always shut off the water at the base before leaving the office at night.

IMPROVED
ADJUSTABLE FOUNTAIN SPITTOON.

Patented May 24, 1881.



Dentists so situated that a supply of running water is available will find a Fountain Spittoon invaluable. It can be had as a separate appliance, or as a chair attachment.

Recent improvements are the running of the supply pipe outside of the basin, which gives more room and prevents splashing; and the making of the tumbler-holder in the form of a bowl, so placed that any overflow passes into the basin.

The separate appliance (here shown) is known as the Improved Adjustable Fountain Spittoon. The basin is mounted on a telescoping standard, ball-and-socket joints at the top and bottom of which give it a universal adjustment. The water supply is governed by a globe valve in the base and passes to the basin through silk-covered rubber tubing, the standard acting as a conduit for the waste-water. The top of the basin in its lowest adjustment is 29 inches from the floor; at its highest, 44 inches In the former position the center of the basin may be placed anywhere within a circle 13 inches in diameter; at its greatest height this circle is 23 inches in diameter. Within these limits the basin may be locked at any point or inclination. The diameter of the basin has been increased from 9 inches to 10½ inches.

The appliance is well made and handsomely finished, the base and standard japanned and ornamented. (For description of parts, see pages 14, 16, 17.)

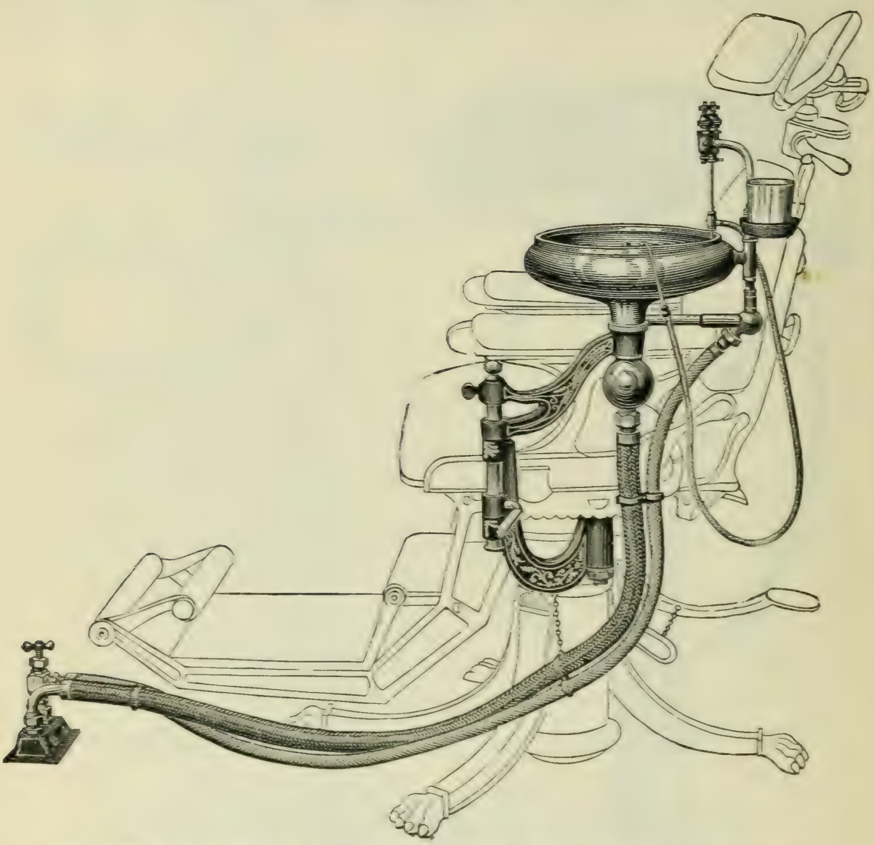
Complete, with two Faucets and Saliva Ejector with Silk-covered Tubing (as shown)	$70.00
" " " " without Saliva Ejector	64.00
" " one Faucet " " "	58.00
Boxing	2.00

IMPROVED ATTACHED FOUNTAIN SPITTOON.

Patented November 20, 1877; May 24, 1881.

APPLICABLE TO THE WILKERSON AND PEDAL-LEVER CHAIRS.

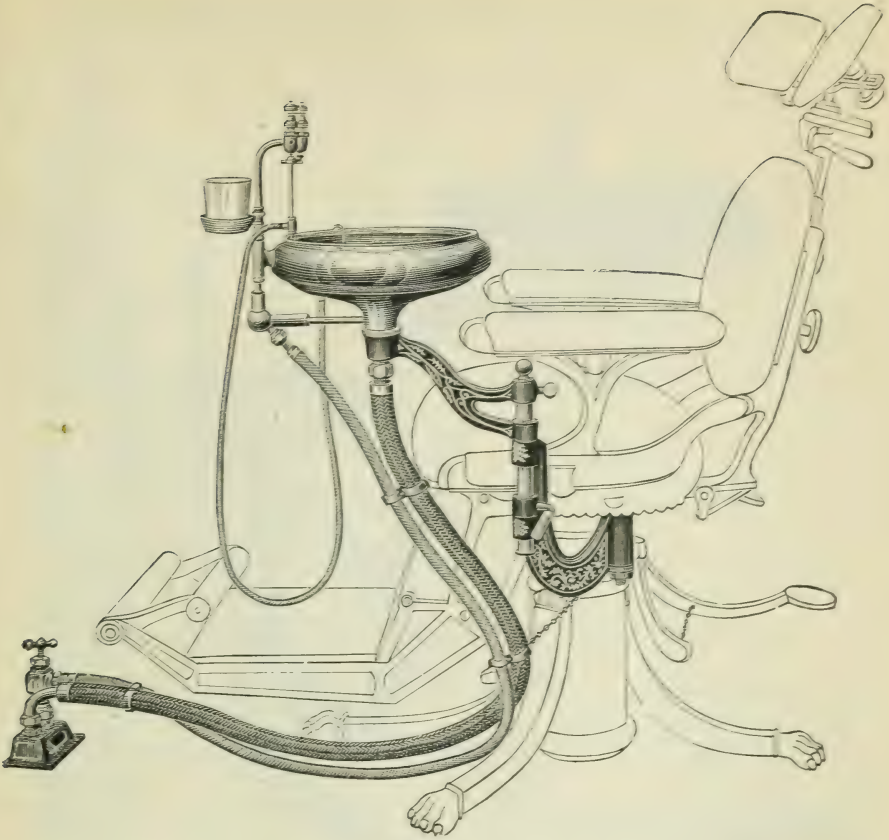
Method of Attachment suggested by Dr. H. C. Register.



The Attached Fountain Spittoon (illustrated on this and the following page) is fastened to the chair by a swinging crane bolted beneath the chair seat; and passing through the outer extremity of this crane is a rod, to the upper end of which is attached the basin by means of a bracket arm. This rod turns in its socket and permits the spittoon to be carried from front to back of chair. It can be held at any point within this range by simply turning the clamp handle. The entire attachment moves with the chair body in raising, lowering, turning, etc.

The water supply is admitted by means of a globe valve placed in an ornamented iron base-piece, to which is attached also the flexible waste-tube, extending from the bottom of the basin.

The basin in all forms is ten and one-half inches in diameter at the mouth, and has a depth of three inches. A double jet tube revolves in the center of the basin, throwing two small streams which form a sheet of water across its diameter. All metal parts of the Spittoon proper are nickel-plated. The rubber tubing is silk-covered. The illustrations show the double faucet and saliva ejectors. Either form can be had without the saliva ejector, and with



single faucet for water supply only, as also with or without the gold-trap. The bringing of the intake of the water supply pipe and the outlet of the waste pipe close together in the bases of the respective forms, reduces the plumbing work to the connection of the base with the outside supply and waste pipes.

PRICES.

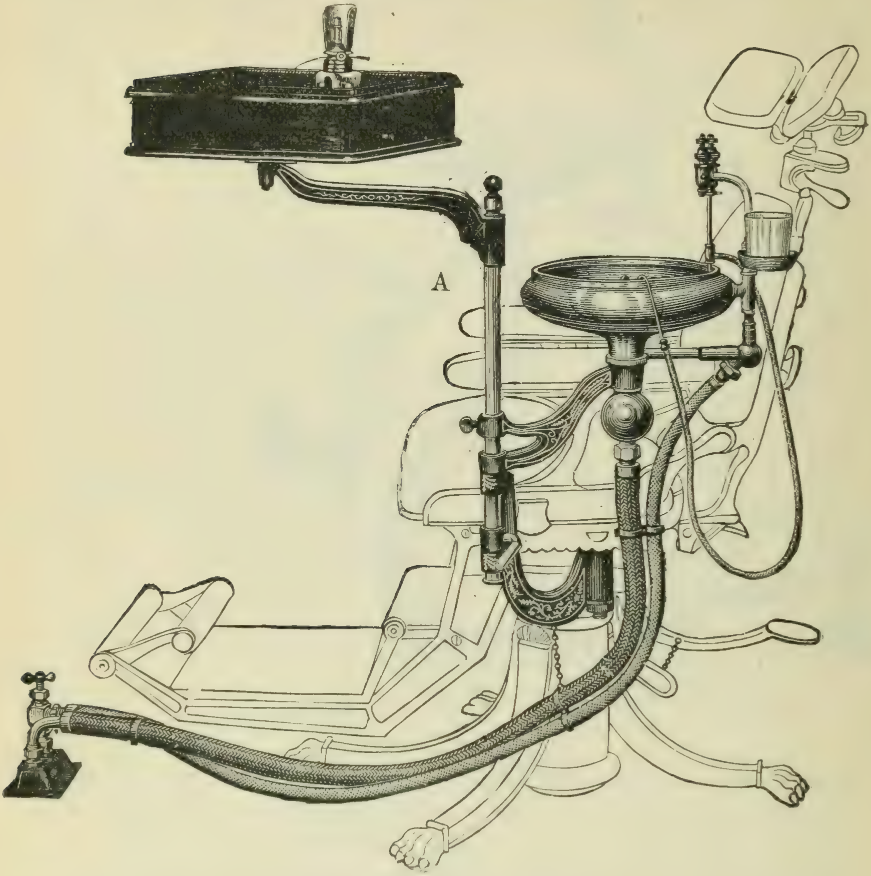
Spittoon complete, with Saliva Ejector and Gold-Trap . .	$70.00
“ “ “ “ “ without Gold-Trap .	66.00
“ with Double Faucet, without Saliva Ejector, with Gold-Trap	64.00
Spittoon with Double Faucet, without Saliva Ejector or Gold-Trap	60.00
Spittoon with Single Faucet, with Gold-Trap	58.00
“ “ “ “ without Gold-Trap . . .	54.00

BOXING FREE.

Full directions for setting up and regulating the Fountain Spittoon accompany each Attachment sold.

Attached Fountain Spittoon with Bracket Table.

Patented November 20, 1877; May 24, 1881.



This combination meets the wants of those who prefer a bracket and table attached to the chair.

The rod A is elongated to bring the table to the proper height. The table bracket swings on this rod, which can be raised or lowered, and the table brought into any position convenient for the operator.

This combination will be found especially useful in offices where the bracket cannot be conveniently attached to the wall.

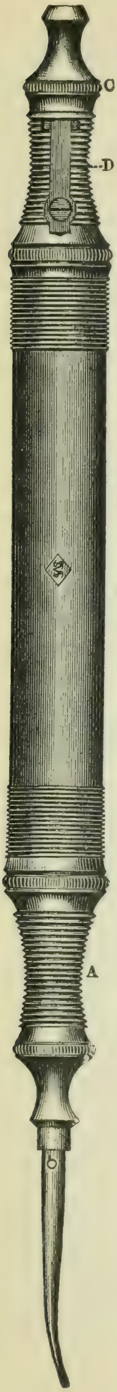
PRICE.

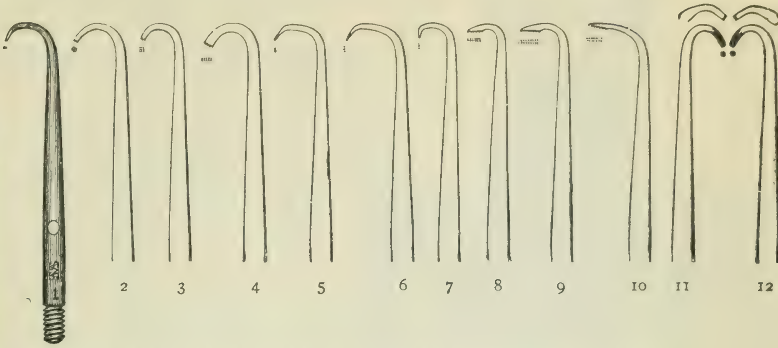
Combination as illustrated, with plain Allan Table . .	$85.50
" with Imitation Rosewood Table . . .	79.50
" " Glass-Side Allan Table	88.50
" " Holmes Table	105.50

BOXING FREE.

The Abbott Automatic Mallet.

Patented in Great Britain and United States, August 16, 1887.





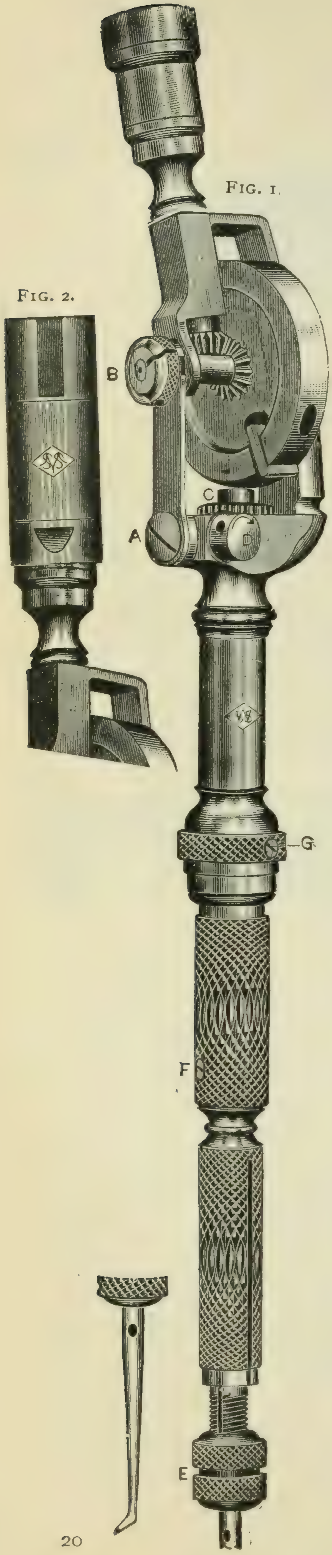
The Abbott Mallet is simple in construction, effective in operation. The working parts are free from the case, being carried on a spindle passing through the instrument, thus avoiding the principal source of friction. One end of the Mallet carries the back-action points shown in the cut; these are believed to be sufficient for all requirements.

For the direct-action blow, the Cone-Socket, Snow & Lewis, or Royce's Set of Points may be used.

PRICE OF THE ABBOTT MALLET,

$8.00.

Price of Back-Action Points, Nos. 1 to 7 . .	each	$0.40
" " " " 8 " 12 . .	"	.50
" " " Set of 12 . .		5.25



Patented Aug. 19, 1890.

THE BONWILL
IMPROVED
Mechanical Mallet, No. 1,
FOR SOCKET-POINTS.

Patented February 18, 1879; Sept. 29, 1885;
March 6, 1888.

In this Mallet the blow is delivered by a revolving hammer, a metal wheel with a steel plate let into its rim, and projecting sufficiently to strike the head of the plunger at each revolution of the wheel. The other end of the plunger is hollow, and split in three sections, for the reception of the plugging-point. It will hold securely the Snow & Lewis, Cone-Socket, or Engine-bits.

The rapidity of the blows is only limited by the speed at which the engine is run. The force of the blow can be varied by running the engine faster or slower, or by greater or less pressure on the plugging-point, or by squeezing the split portion of the case. As sent out, the Mallets are properly adjusted for use, and on no account must the hammer projection be disturbed. All the adjustment necessary is to be accomplished by turning the adjuster. This revolves a worm-gear, which moves very slowly, permitting an adjustment as close as the thousandth part of an inch. No change ought to be necessary except from wear.

The Mallet is held in the hand like a pen or pencil, with the two first fingers resting upon the squeeze-nut, and the thumb against the milled portion of the case. This manner of holding it gives complete control of the working of the Mallet. The blows may be intermitted temporarily without stopping the engine, as in picking up and placing the gold, by simply extending the fingers, thus removing the end of the plunger from contact with the hammer; or the blows may be made almost continuous, by flexing the fingers; or the plugging-point may be turned and directed by a movement of the thumb and fingers.

The milled portion of the case is swiveled at G, to permit change in the position of the plugging-point.

The Mechanical Mallet No. 1 can be used with the Nos. 4, 6, 7, or 8 Hand-pieces, with or without the Slip-Joint Connection, and can be operated by any of our Engines. Fig. 1 shows the Slip-Joint Connection No. 1. Fig. 2 shows the Slip-Joint Connection No. 2.

Directions for use with each Mallet.

Price $10.00

In ordering, be sure to indicate which attachment is wanted.

THE BONWILL

Improved Mechanical Mallet, No. 2,

FOR

ELECTRIC MALLET PLUGGERS.

Patented October 15, 1878; February 18, 1879;
Sept. 29, 1885; March 6, 1888;
April 30, 1889.

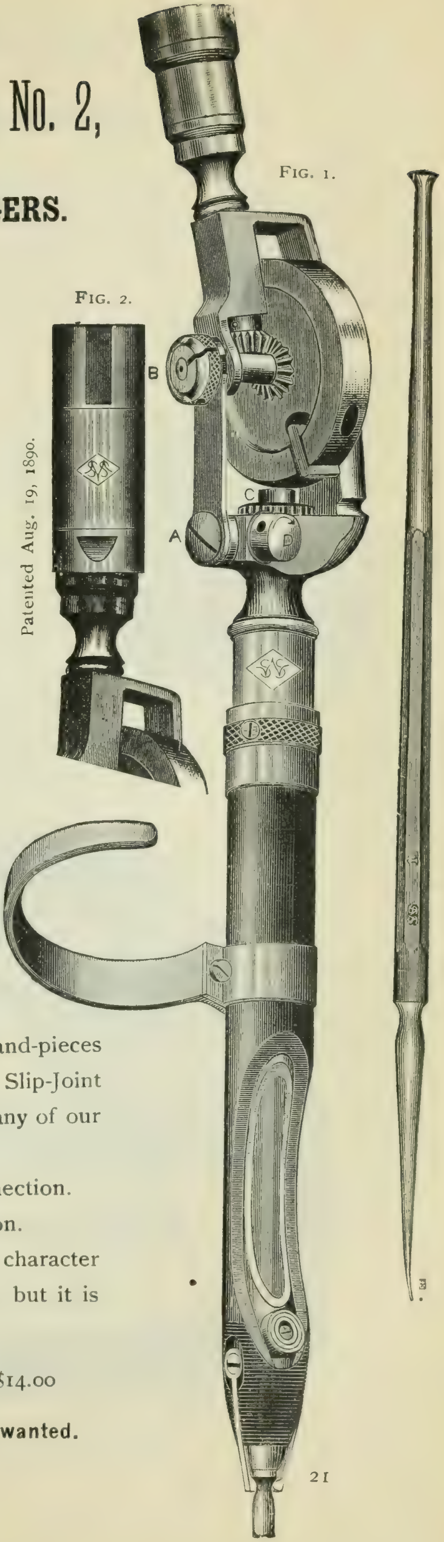


FIG. 1.

FIG. 2.

Patented Aug. 19, 1890.

This is a modification of the well-known engine mallet (see opposite page) to adapt it to the use of the long-handle pluggers made for the Electric Mallet. Ordinary socket-points can also be used in it with equal facility by means of the proper socket-handles.

The new appliance is in effect an adaptation of the advantages of form and the construction of the Electric Mallet to the needs of engine malleting. The stem is of hard rubber or vulcanite, with finger-slot, stop-motion, springs for holding the instrument steady, and ring for the support of the Mallet.

The No. 2 Mallet can be used with Hand-pieces Nos. 4, 6, 7, or 8, with or without the Slip-Joint Connection, and can be operated with any of our engines.

Fig. 1 shows the No. 1 Slip-Joint Connection.

Fig. 2 is the No. 2 Slip-Joint Connection.

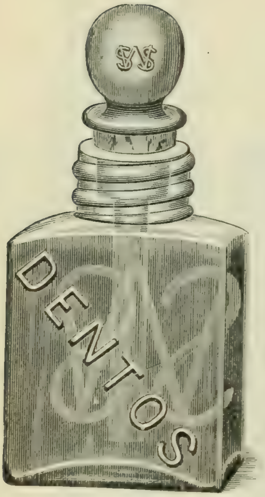
The plugger is illustrated to show the character of the instrument used in this Mallet, but it is not included in the price.

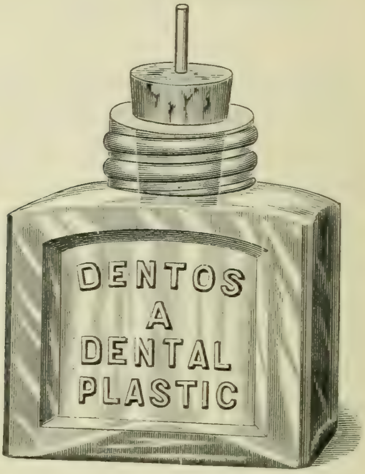
Price $14.00

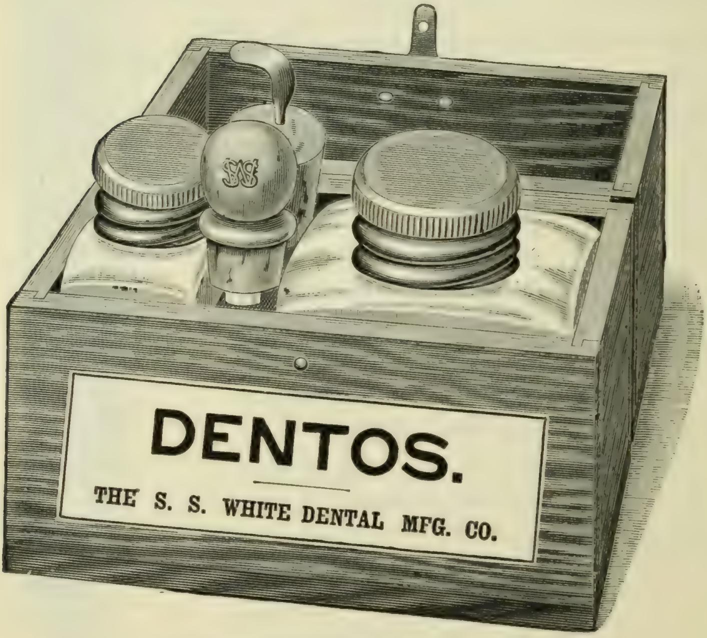
In ordering, state which attachment is wanted.

DENTOS.

AN ALUMINUM-PHOSPHATE PLASTIC.






DENTOS.
THE S. S. WHITE DENTAL MFG. CO.

[ILLUSTRATIONS FULL SIZE.]

DENTOS.

This New Dental Plastic differs widely from the common multitude of zinc-phosphate cements. The *Dentos Powder* contains no zinc oxid, but has for its base aluminum oxid. The base of the *Dentos Liquid* is essentially a chemically pure phosphoric acid (not the common glacial acid), and is not subject to the uncertainty and annoyance of crystallization.

Dentos is, therefore, broadly and distinctively an Aluminum-Phosphate Plastic ; the first of its kind in the field, and readily discriminated from the zinc phosphates and chlorids by the sharp grit of its powder, which is so refractory that complete pulverization is impracticable, even if it were desirable.

Dentos Powder and Liquid, properly mixed, make a dental plastic which hardens in three minutes. Its hardness after a few hours is phenomenal, while its resistance to dental attrition and the action of stomatic fluids is, so far as we know, unequaled. The dentist from whom we obtained the original formulas points to seven years of test under observation, as showing its durability, his preliminary experiments having been conducted persistently for a period of more than twenty years.

The novel nature of Dentos requires that the specific instructions which accompany each package shall be carefully followed.

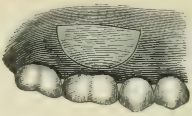
Dentos Powder is put up in the one natural color, which produces, when mixed, a light neutral tint that accords well with many dental shades. The large, low bottles have broad bases, so that, if it is at any time desirable to remove them from the boxes, they will not be easily upset.

For exceptional cases we supply a small, four-color powder package,—gray, yellow, blue, and brown,—from which a very little portion may be taken to mix (with the one or more drops of liquid for the regular powder) to produce the desired shade. A little practice will enable one to make quite a colorable dental imitation in a conspicuous filling.

Dentos, per package, natural color	each	$2.00
" " " four colors, powder (no liquid)	"	1.00
" small sample, natural color	"	.20

THE S. S. WHITE DENTAL MFG. CO.'S

Capsicum Plasters.



Here are the grounds upon which we ask dentists to use these Capsicum Plasters in preference to all others:

1st. They are at least equal in quality of materials and effectiveness of work to any others. None are better; few, if any, as good.

2d. They are unquestionably superior in form to any others: just the right shape—a half-moon—for the locality in which they are to be used and to avoid waste of effort.

3d. They are cheaper than any others,—about two-fifths of a cent apiece.

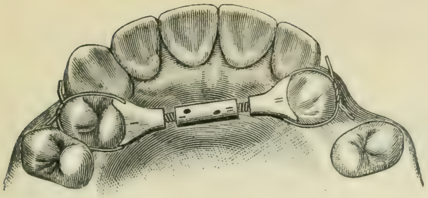
Capsicum is the classical application where a gentle, persistent stimulant is required for its counter-irritant effect, because it has a "certain right kind of strongness." It is not escharotic, but penetrates deeply, and so is the standard analgesic for dental uses; as in the initial stages of pericemental inflammation; in soreness about the roots of the teeth due to external violence, for example from the improper or excessive use of ligatures; for relief to severe neuralgias following extraction, etc. Its penetrating power enables it to relieve the engorgement which causes the trouble. Its chiefest recommendation is the facility with which it aborts inflammations which, unchecked, may lead to abscess; when, however, the inflammation has proceeded so far that it cannot be aborted, the persistent use of the Capsicum favors the production of suppuration. Thus, if it cannot relieve by resolution, it will help to force the issue to a conclusion by making an outlet for the pus generated at the seat of trouble.

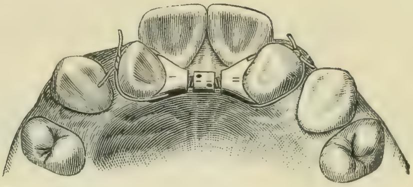
The most convenient form for dental uses is the Plaster. A Capsicum Plaster consists of the medicated preparation spread on a thin backing of white rubber. Applied to the seat of trouble, a little firm pressure fixes it in position,—if properly made, as these of ours are,—where it can be allowed to remain until the desired effect is produced. The backing shields all parts of the mucous membrane, except the surface to which the Plaster is applied, from the effect of the Capsicum.

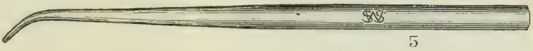
Put up in envelopes, *with directions for use*, each envelope containing three Plasters; forty-eight of the envelopes—one gross of Plasters—are inclosed in a neat enameled paper box, gilt trimmed.

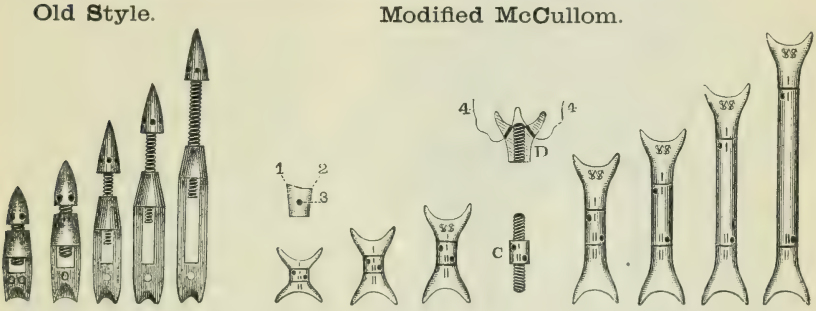
Price . . . . per gross 60 cents.

JACK-SCREWS.









00	0	1	2	3	A	B	C		D	E	F	G
½	⅝	$\frac{13}{16}$	⅞	1 $\frac{1}{16}$	¼	$\frac{5}{16}$	⅜	½	⅝	¾	1	1¼
⅝	¾	1 $\frac{1}{16}$	1 $\frac{5}{16}$	1 $\frac{9}{16}$	$\frac{5}{16}$	⅜	½	⅝	¾	1	1¼	1½

Each Jack-Screw length *closed* is indicated above the line in fractions of an inch; the *open* length is found below the line.

Dr. E. S. Talbot having suggested the need for some very short Jack-Screws, we have revised the series, adopting the thinner and finer screw thread of the "Old Style," and modifying the "McCullom" heads to fit the cervical eminences of the teeth. The cuts depict the sizes and lengths when closed. The A, B, C Heads vary in shortness, but the D Head is long and is used on the E, F, and G Bars. The D Heads put on the C Bar make the ½ inch closed Jack-Screw. One side of each Head is longer (as at 1) than the other side (see 2), in order that the long or short side may go next the gum according as the tooth may incline forward or back. The ligature holes (see 3) pass through the sides so that the ligature (see 4 in the section view of a D Head) will draw the Head directly upon the tooth as shown in the two illustrations of the applied Jack-Screws.

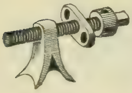
Each right-hand Bar-Screw has a mark (1) to show that it will screw into a right-hand Head on which is a like mark (1). Each left-hand Bar-screw and Head has *two* such marks (11), so that no mistake need be made in changing a long Head for a short Head (as D in place of C, for instance). Whatever the space between the teeth, it can be exactly fitted by reason of the interchangeableness of these Heads and Bars. Some extraordinary cases can be met by putting an "Old Style" (say No. 3) Bar in a right-hand McCullom Head, or a right-hand McCullom Bar in an "Old Style" Head.

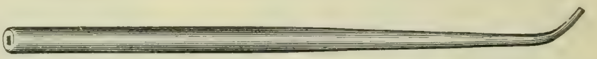
All are made with perfect screws and are nickel-plated all over. Fig. 5 shows a Pin-Wrench for operating all the screws. The two illustrations afford examples of the new McCullom Jack-Screws in position.

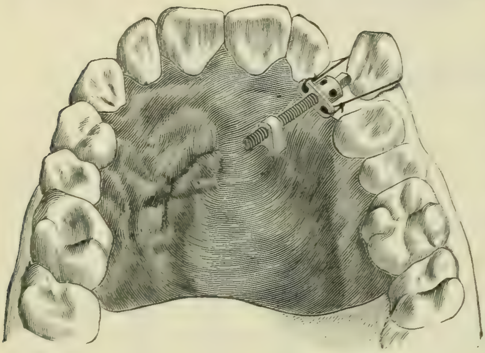
PRICES.

Old Style Jack-Screws, Nos. 00 to 3	each	$1.50
Modified McCullom Jack-Screws, A to G . . .	"	1.50
Jack-Screw Pin-Wrench	"	.20

Dr. F. H. Lee's
Improved Regulating-Screw and Pull-Back.







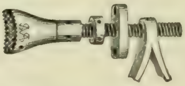
This Pull-back Jack-screw was designed as an improvement upon Dr. Littig's device. Its special use is for drawing in obstinate cuspids which have erupted outside of the line of the arch, but it will work with equal satisfaction on any of the other teeth.

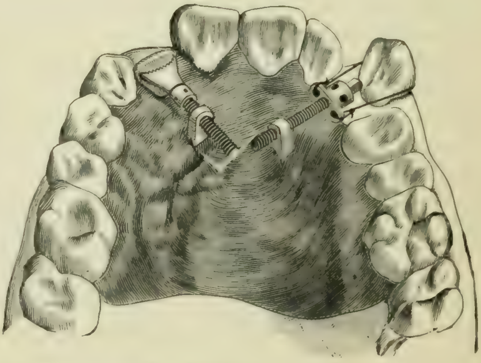
The post or nut is set in position and held by vulcanizing into a rubber plate fitting the mouth as shown in the cut; the screw-bolt is then placed through the post, and a wire or ligature (wire preferred) is passed around the tooth, the ends being secured to the holes in the cross-head or swivel-block. The wire is then tightened from time to time as the tooth is brought to its place. To prevent the plate from being moved out of position by the strain upon it, it should be fastened to the teeth of the arch. The screw-bolt is ⅝-in. long.

Price $2.00

THE LEE-BENNETT JACK-SCREW,

FOR REGULATING TEETH.

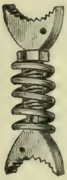


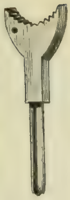


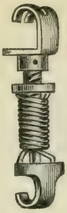
This improvement by Dr. G. W. Bennett combines a swiveled Jack-screw with Dr. Lee's appliance, so that any tooth may be pushed outward into line, as shown by the cut. On occasion, both devices may be fixed in the same plate, and be simultaneously operated, the Lee to pull back one tooth, and the Lee-Bennett to push out another. Both of the operating screws may be turned by the same lever. The separate cut of the appliance, which is 7⅞-in. long, is an exact representation of it.

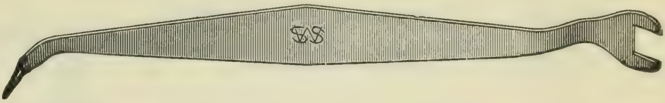
Price, Dr. Bennett's Jack-screw $2.25

HOLMES'S SPRING JACK-SCREWS.


1


2


3



The devices of Dr. T. Stanton Holmes combine the screw and spring methods of moving teeth for regulating purposes. Fig. A shows the *pushing* action of the No. 1 style, which is to be operated by the nut-fitting end of the wrench; and Fig. B shows the *pulling* action of No. 3, the swiveled screw-head of which may be turned by the pointed end of the wrench. In both instances the turning of the screw causes a forcible spring action to the *extent only of the screw-thrust*, and so avoids the common danger of spring action, which, if neglected, may carry the tooth too far. No. 2 Jack is made by the substitution of a Long Head (No. 2) for the Short Head of No. 1.

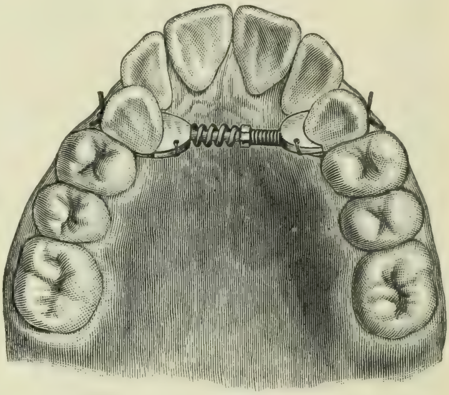


FIG. A.

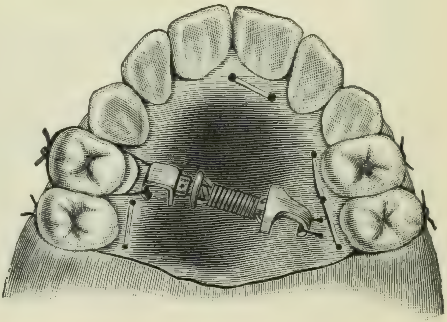


FIG. B.

PRICES.

The Set, complete .	$5.00
Pushing Spring Jack (Short or Long Head) . .	1.75
Extra Heads . each	.50
Pulling Spring Jack, No. 3 . . .	2.50
Wrench . . .	.25

BEST QUALITY PIANO-WIRE,

FOR THE COFFIN SPLIT-PLATE.

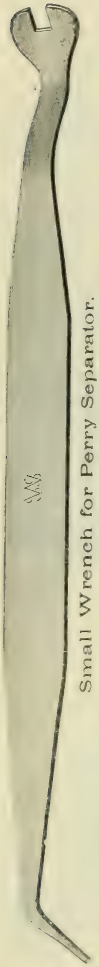
We are prepared to supply five sizes of wire for regulating teeth by the Coffin Split-plate method. Put up in bundles containing two pieces, 7½ inches long, of each of the five sizes.

Price . . . . per bundle 20 cents.

PERRY'S TWO-BAR SEPARATORS.

Invented by Dr. SAFFORD G. PERRY. Patented July 5, 1887.

Perry's Separators are smaller,
More rapidly adjusted,
Better adapted to the
variously located cavities, and are less
obstructive to
the light than any others.



Small Wrench for Perry Separator.

FIG. 1.

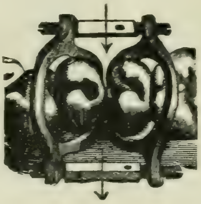
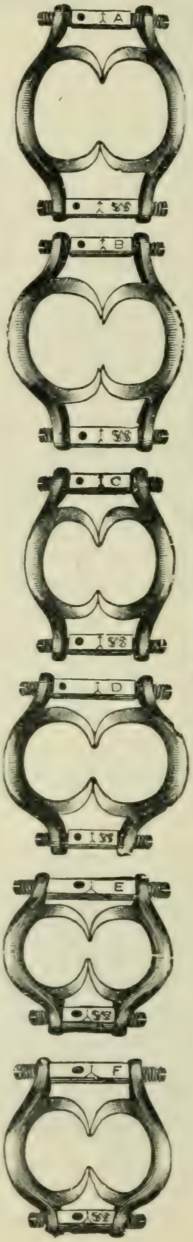


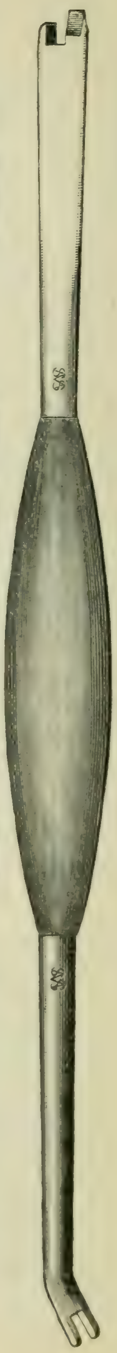
Fig. 1 shows the Separator applied. When there is a tendency, as with teeth of narrow necks, to slip toward the gum, wood or gutta-percha props are to be put on the adjacent teeth under the bows to prevent them from tilting and to keep the points from being forced under the gums while the teeth are being separated.

The arrows on the bars show which way to turn them to spread the Separators.

PRICES.

Two-Bar Separators . .	each	$3.50
Wrench for same . .	"	1.25
Small Wrench for same .	"	.50
Set of 6 in Case		24.00

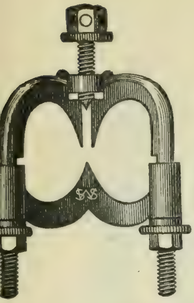


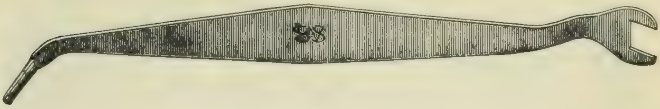


UNIVERSAL SEPARATOR.

INVENTED BY DR. H. A. PARR.

Patented October 5, 1886.





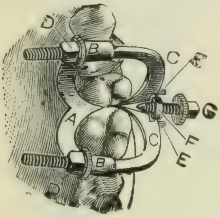


FIG. 1.

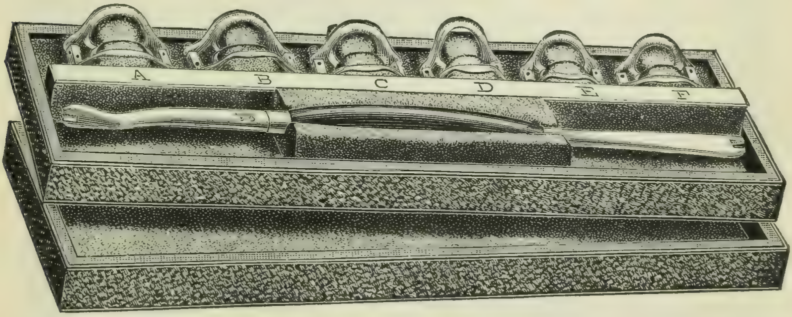
Dr. Parr claims that this Separator is universal in application and adjustment between teeth of all denominations in either jaw; it is therefore manufactured in a single form of the exact size of the cut. The mode of its application to teeth of all kinds is made obvious by the illustration, Fig. 1. The nuts D D can be moved with the thumb and finger, or the wrench, as required to force the wedging points between the teeth; and as the nuts move independently of each other, the arms can be more or less drawn to adapt the pressure to the varying curves of the teeth. Greater separating force will be obtained by turning the screw G.

With this device teeth may be regulated, or be held by wedges in the positions to which the Separator has forced them.

PRICES.

Universal Separator with Wrench	$7.50
Wrench separately	.25

CASE FOR PERRY TWO-BAR SEPARATORS.



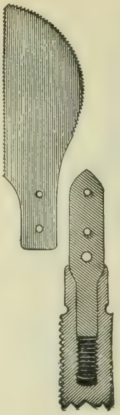
This neat Case for the Perry Two-Bar Separators contains blocks fitted to the individual Separators and to the Key. The blocks for the Separators are lettered to correspond with them, so that the dentist can always be sure of picking up the form desired. The Separators are now sold with or without the Case. Those who have the set can purchase the Case separately.

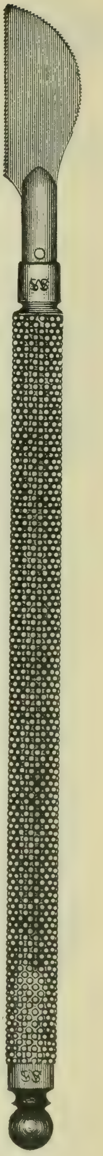
Covered with morocco, and lined with velvet.

Price, Case separately $2.00

SEPARATING SAWS.

Pattern furnished by Dr. Gordon White.





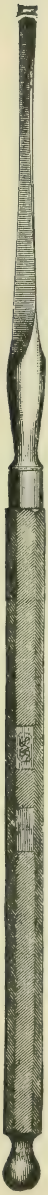
This little instrument is designed for separations preparatory to the use of the disk or strip between the teeth before or after the fillings are made, without the objection of cutting the soft parts and lips, which is so frequently the case with the ribbon saw or separating file.

Price, complete .	.	75	cents.
" of Saws .	each	25	"
" " Holder .	"	35	"
" " Handle .	"	15	"

May be used in Cone-Socket Handles Nos. 3, 5, 8, 10*a*.

FIXED-BLADE SEPARATOR.

Devised by Dr. Gordon White.

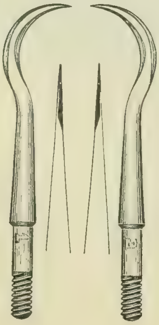


For immediate separation of teeth, whether for operations or for thorough examination, this instrument has the advantages of handiness, celerity, and effectiveness. It is manipulated by forcing the thin portion of the blade between the teeth to be separated, then pulling outward slowly and firmly, with a little swaying motion, until the proper space is obtained. The force so applied tends to spread the teeth outwardly, the reverse of the keystone action of the ordinary wedge, and thus a wider space is very easily obtained. Dr. White describes his method of using it in the "Hints and Queries," Dental Cosmos, June, 1889.

Price, Nickel-plated . . . . 75 cents.

APPROXIMAL TRIMMERS.

Dr. Gordon White's Pattern.

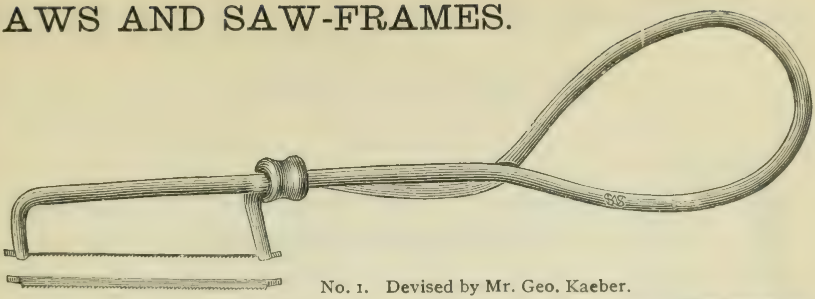


Of these instruments Dr. White says, "There is nothing that equals them for trimming the cervical margins of approximal fillings, and trimming the approximal sides of roots preparatory for crowns." Of the patterns submitted to Dr. White for approval, he says, "The samples are very satisfactory, and I am using them every day with great comfort."

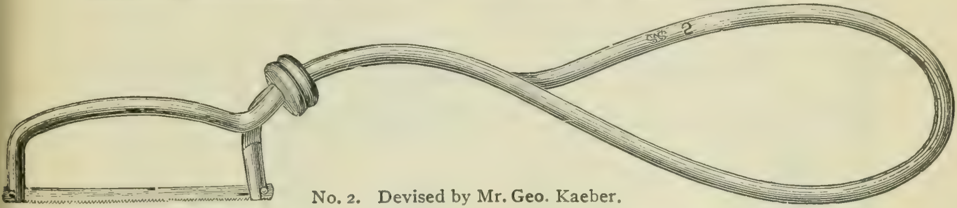
PRICE.

For Cone-Socket Handles, each 35 cents.

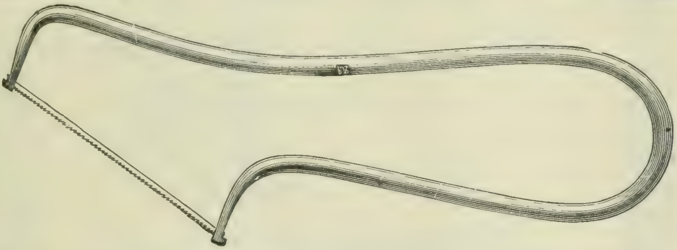
SAWS AND SAW-FRAMES.



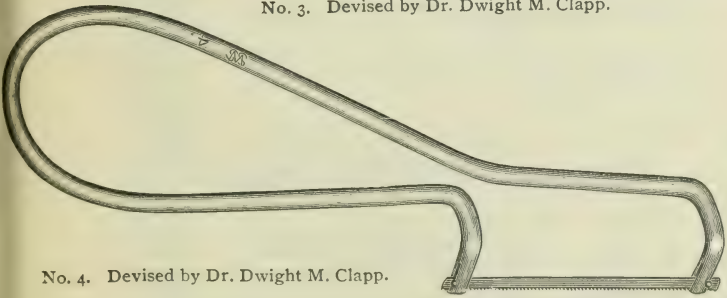
No. 1. Devised by Mr. Geo. Kaeber.



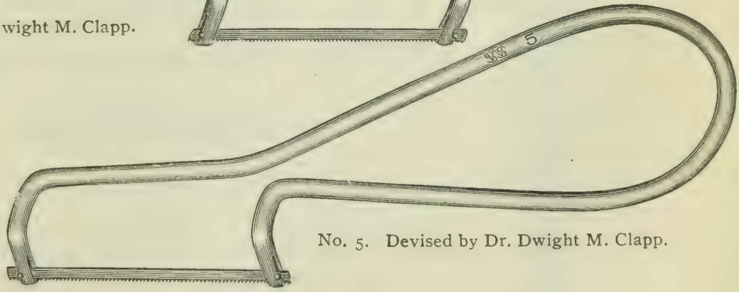
No. 2. Devised by Mr. Geo. Kaeber.



No. 3. Devised by Dr. Dwight M. Clapp.



No. 4. Devised by Dr. Dwight M. Clapp.



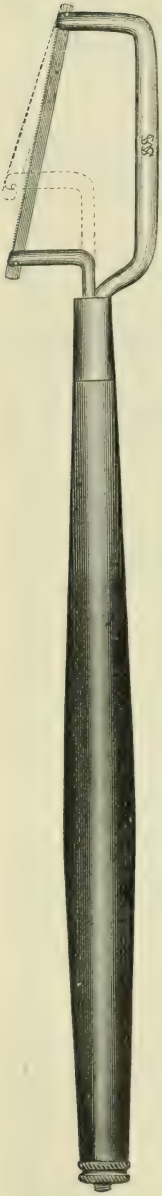
No. 5. Devised by Dr. Dwight M. Clapp.

PRICES.

Kaeber Frame No. 1, with one Saw		$0.60
" " " 2, " "		.75
Clapp " " 3, " "		.30
" " " 4, Right Side, with one Saw		.40
" " " 5, Left " " "		.40
Flat-face Files	per doz.	1.00
Saws for Frames Nos. 1, 2, 3, cut on one edge	"	.25
" " " " " both edges	"	.38

ADJUSTABLE SAW-FRAME.

Devised by Dr. CECIL P. WILSON.



Adjustable, by the Milled Nut on the end of the handle, to different lengths of Saws.

Holds them firmly, without possibility of displacement.

IT IS THE

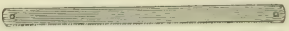
MOST COMPLETE SAW-FRAME

For Dental Use.

PRICES.

Adjustable Frame, with one Saw . . .		$1.50
Saws cut on one edge . . .	per doz.	.25
" " " both edges . . .	"	.38
Files, flat face	"	1.00

Flexo Saws for Saw-Frames.



Flexo Files for Saw-Frames.

The Saws for Saw-Frames are made in one size; the Files for Frames in one size, cutting on the edge and one side. Both are made specially for the Kaeber Frame, but can be used readily on the Clapp or Wilson.

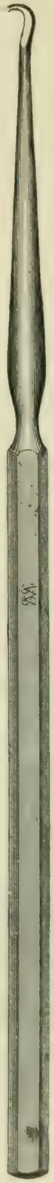
PRICES.

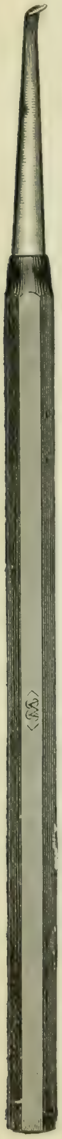
Saws for Frame, cut on one edge	per doz.	$0.25
" " " cut on both edges	"	.38
Files for Frame, flat face	"	1.00

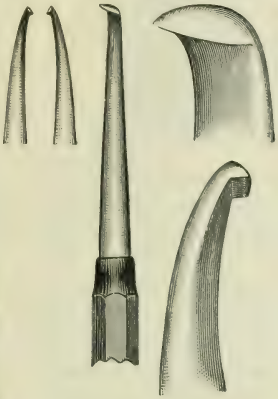
LIGATURE CUTTER.

Suggested by Dr. GARRETT NEWKIRK.

The inner side of the hook has a knife-edge, and the point is made blunt to avoid any risk of wounding the gum or puncturing the rubber-dam, as is likely to occur when a lancet is used to remove a ligature. They are used with the pull-cut.







Price, Octagon Steel Handles, Nickel-plated, each . . 35 cents.

Cone-Socket Points, each . . 25 cents.

ENAMEL CLEAVERS.

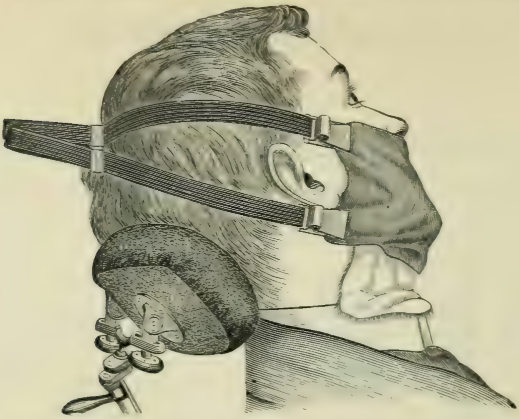
Patterns furnished by Dr. CALVIN S. CASE.

These instruments are to be used in removing enamel that presents a practically unbroken surface. They are so shaped that they " can be partially rotated under the margin of the gum, presenting a sharp point toward portions of the enamel that will not easily cleave off, with a view to fracturing it as the diamond cuts glass, breaking it up into small particles which can be quickly detached and the sides straightened and smoothed by the broad blade."

Securely fixed on handles similar to our No. 10 A Cone-Socket Handle. Right and Left.

Price . . per pair $1.20, or each 60 cents.

NOVEL RUBBER-DAM HOLDER.



The Novel Rubber-Dam Holder illustrated is a modified spring clip having a broad base and a wide holding tongue that grips the rubber by simply pressing down the tongue. This is readily released by pinching the tongue-loop between the thumb and finger.

While a single braid, slide, and two clips suffice for some cases, the preferred Duplex Holder shown in the cut consists of two braids, a double slide, and four clips. The rubber may thus be gripped at two wide-apart places on either side, and the braids one after the other be drawn through the slide at the back of the head to pull the rubber smoothly out of the way of the operator, and dispense with the use of weights. A napkin laid over the lower teeth (see illustration) is compressed to prevent the flow of saliva under the rubber, or its disagreeable contact with the chin.

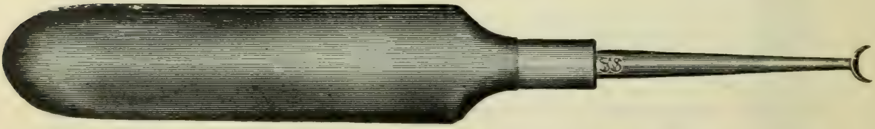
High commendation has been given the Duplex Holder by notable operators.

PRICES.

Novel Rubber-Dam Holder, No. 4, Two Clips, Wide Cotton Gum Braid with Slide	$1.15
Novel Duplex Rubber-Dam Holder, No. 5, Four Clips, with Cotton Gum Braid and Double Slide	2.25

GUM RETRACTOR.

Suggestion of Dr. T. F. Chupein.



Designed to hold back the gum, or the rubber-dam, while filling those very troublesome cavities which extend under the gum on the labial surfaces of the anterior teeth.

The Retractor is to be held in the left hand of the operator, or by the assistant, and is so nicely shaped that its hold on the tooth-neck is close, to exclude moisture, and secure against slipping.

Ebony Handles.

Price . . . . each 75 cents.

ASEPTIC DENTAL ABSORBENT COTTON.

CUT THIS OUT.
ABSORBENT
DENTAL COTTON
IN AIR-TIGHT ASEPTIC CONTAINER
THE S. S. WHITE DENTAL M'F'G. CO.
PHILADELPHIA, U. S. A.
New York, Boston, Chicago, Brooklyn, Atlanta.

Aseptic Absorbent Cotton in an aseptic Container is the latest and best thing in absorbents. The Cotton is of extra long fiber, and specially carded to retain its fiber length. The weight of Cotton in the Container varies between two and three ounces. The Container is in itself a very convenient Holder. It is only necessary to cut out the piece in the center of the top, as shown in the cut, and it is ready for use.

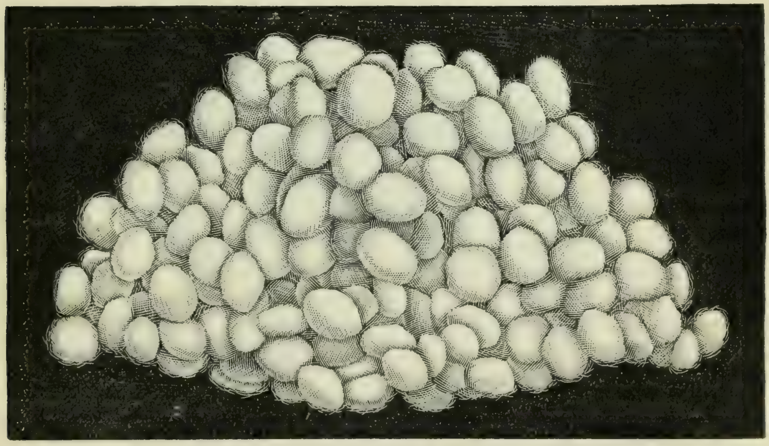
This is not only the best, but taking into account the quantity in the box, it is the cheapest Dental Absorbent Cotton sold.

The cut is one-half of the full size.

Price . . . . each $0.30

Dr. G. B. Richmond's Cotton Dental Pellets.

Patented September 11, 1894.



These Pellets are made in four sizes, and of the finest absorbent cotton. They will be found a great convenience to the operator, saving the time required to prepare pellets in the usual way.

Put up in packages containing the four sizes, assorted.

Price, boxes containing 8000 to 10,000 Pellets . .	each $0.25
" " " about 5000 " . .	" .15

PERFECTION POLISHING STRIPS.

MADE IN FIVE VARIETIES.

GARNET,
EMERY,
LAVA,
FLINT,
FRENCH EMERY.

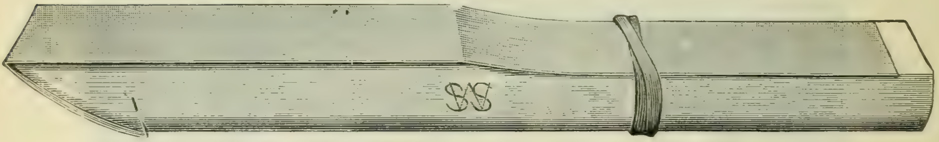
The foundation on which the polishing material is laid is specially adapted to this purpose, is quite thin, yet very strong, and enables us to obtain perfectly even surface.

Put up in one-gross boxes, separately and assorted.

Price . . . . per gross 50 cents.

FINISHING STRIPS AND CARRIER.

Devised by DR. N. S. BORNEMAN.



This device affords a ready means of manipulating sand- and emery-paper strips in finishing vulcanite or celluloid plates. The Carrier is of wood, one end being cut off obliquely, the end thus formed being rounded, and with a kerf cut into the back, at the beginning of the slant. One end of a strip of sand- or emery-paper of the size furnished is then inserted in the kerf, the strip brought over the point and along the flat side of the carrier, and a rubber band slipped over it to hold it in place. The handle part of the Carrier has a thumb-hold.

This appliance gives the dentist three advantageous working surfaces of different shapes,—the rounded slanting end, the sharp edge, and long flat face.

The strips are put up 50 in a box, sand- and emery-paper.

PRICES.

Complete, Carrier and box of Finishing Strips	12 cents.
Carrier separately	3 "
Strips separately, per box	10 "

THE DAVIS FRENCH CLOTH STRIPS.

We are now sole manufacturers of these well-known Strips, and are prepared to supply the demand of the trade and the profession.

They are made in four varieties:

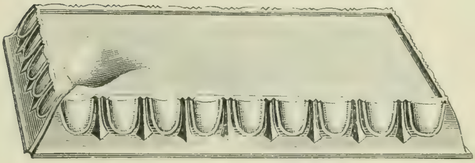
FRENCH EMERY,
AMERICAN EMERY,
GARNET,
LAVA.

Put up in boxes separately, and assorted.

Price . . . . per gross $0.50

THE RICHARDS SLAB.

PATENT APPLIED FOR.



This is a porcelain Tablet, accurately represented in the cut, which is about *one-half* the full size. The rim is slightly raised, and in the left-hand corner there is a depression to catch the surplus fluid, which may then be turned off by the channel, as shown. One of the excellent features of this Tablet is the roughened under-surface which prevents its slipping about when in use.

Price . . . . each 30 cents.

PRECIPITATED CHALK.

Half-Pound Rice-Paper Bags, Boxed.

We have been selling Precipitated Chalk well onto half a century, but never before in so neat and convenient a form as now:

A clean-looking rice-paper bag, holding a half-pound, snugly gummed, sides and bottom, into a neat paper box, then the open end of the bag after the chalk is put in folded over and sealed, and the box-lid, which is hinged, shut down and sealed also. The box is covered with ornamental paper, gilt trimmed. Looks neat, carries well, and anybody can see the convenience.

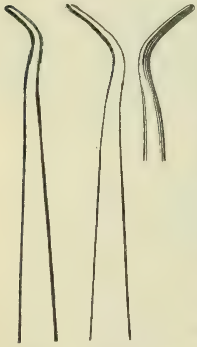
As to the contents: When we talk of Precipitated Chalk, we do not refer to what is commonly known as "prepared chalk," which is quite a different thing, with plenty of grit in it. Precipitated Chalk is calcium carbonate in a state of molecular subdivision, and is, as a prominent dentist is in the habit of telling his patients, "the one substance which combines in itself all the elements of a perfect dentifrice. It is antacid, detergent, cleansing, and while not, strictly speaking, an antiseptic, the thorough cleansing which its use involves makes the whole mouth aseptic."

Where the dentist wants simply the antacid, detergent, cleansing, aseptic effect without other complication, he will find it in this Precipitated Chalk of ours. Fine as the finest tooth-powder, free from grit, with only the abrasiveness inherent to the calcium carbonate, which is too little to injure enamel while it will cleanse thoroughly.

Price, in half-pound boxes . . . . per pound 15 cents.

Universal Approximal Instruments for Plastics.

Devised by Dr. Edward C. Kirk.



Small. Large.

The point or blade is of the simple flat burnisher type, with rounded, smooth edges, bent at an angle of about 45° to the shaft, and again canted to one side or twisted at the angle about a quarter of a turn, so that the one instrument reaches all the approximal surfaces. It is particularly effective in condensing or compressing to place pellets of amalgam or gutta-percha, and especially for contouring the surfaces of these materials. It will also be found useful in the adjustment of ligatures under the gingival margins of molars and bicuspids for retaining the rubber-dam, or as an ordinary burnisher for approximal gold fillings.

Two sizes, large and small, made either as Cone-Socket Point or Long-Handle Instrument, nickel-plated. These instruments are not Right and Left; each is universal.

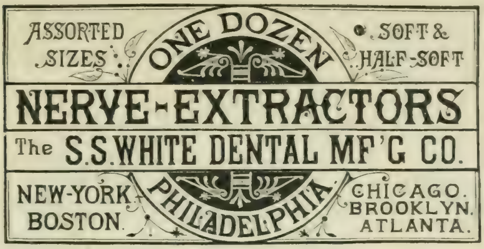
Price . . . . . . each 35 cents.

DR. DARBY'S 4 POPULAR SPECIALTIES.

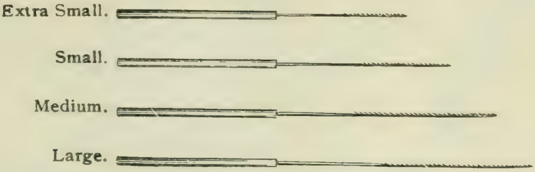
Dental Capsicum Plasters	per box of 80	$1.00
Paper Points (stiffened) for drying pulp-canals . . .	per 100	.25
Hard Buff Polishers for the engine	" 100	.40
" " " for laboratory lathe	" doz.	.25

Send for a $1.00 Combination Package.
Sold at the Depots. Manufactured by Frank B. Darby,
Elmira, N. Y., U. S. A.

BARBED NERVE-EXTRACTORS.



ASSORTED SIZES
ONE DOZEN
SOFT & HALF-SOFT
NERVE-EXTRACTORS
The S.S.WHITE DENTAL MF'G CO.
NEW-YORK
BOSTON.
PHILADELPHIA
CHICAGO.
BROOKLYN.
ATLANTA.



The engraver's art is totally inadequate to reproduce the fineness of our smaller Nerve-Extractors. The cut is as delicate as wood-engraving can be made, but it is coarse compared with the original.

The S. S. White Nerve-Extractors are unequaled in delicacy and regularity of barbing.

We have them in stock in packages as follows:

No. 1, containing one dozen assorted sizes,—Soft and Half Soft.

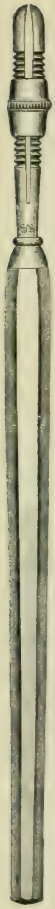
No. 2, containing one dozen extra small,—Soft and Half Soft.

No. 3, containing one dozen small,—Soft and Half Soft.

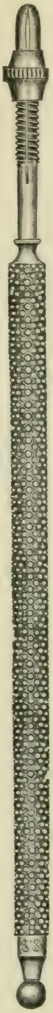
The assorted packages contain small, extra small, medium, and large.

We will, on order, put them up as desired, either in size or temper.

Price . . . . per package 75 cents.



No. 1.



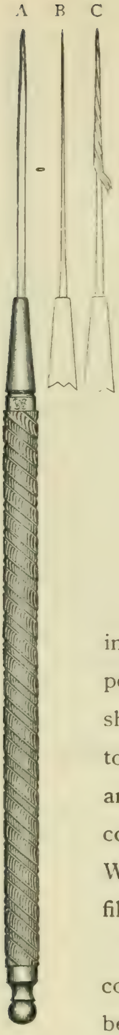
No. 2.

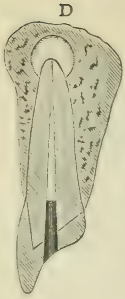
NERVE BROACH HOLDERS Nos. 1 and 2.

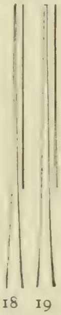
These are now made with a screw ring to hold the broach instead of a slide.

Ivory, Octagon, No. 1	$1.00
Steel, Knurled, No. 2	.75

CANAL DRESSERS.







The cut shows at A the side, and at B the edge of the iridio-platinum blade of the Dresser, which is fixed in a knurled and nickeled steel handle. Between A and B is a cross-section-cut to show the flattened, ovoid shape of the blade, which is squared off at its end. In use, the blade is laid over a very thin wisp of absorbent cotton fibers held between the thumb and finger of the left hand, while the handle is twirled with the right hand to wind the fibers onto the blade as at C. The pulp-canal may be well dried out by repeating this process, and successively inserting and removing the wound blade. Then another wisp may be wound, leaving about an eighth of an inch of the blade-end bare. The blade is then slightly withdrawn to start loose the cotton cone, which when medicated, is placed in the canal and the blade removed, leaving the hollow cone to permit drainage of the abscess until repeated tri-weekly dressings shall have caused the flow of pus to cease. Then a loosened cotton cone can be carried into the canal, and by slight withdrawals and pushes of the blade, its squared-off end will catch and pack the cotton ready for sealing, as shown by the sectional illustration, D. When the abscess has been cured, the canal may be permanently filled.

The Dresser is also adapted for pyorrhea medication, as after the cotton is wound upon the blade and medicated, the blade may be bent to enter the pocket or sinus, wherever situated. Any antiseptic can be used without risk of roughening the smooth iridio-platinum blade, the smoothness of which is essential to its withdrawal from its cotton cone. The silky asbestos fibers may also be used, instead of the cotton or floss silk.

Our Nerve Instruments Nos. 18 and 19 are also Canal Dressers, to be used as previously described for drying, packing, or medicating canals or pockets with non-corrosive antiseptics. Either or both of these steel Dressers are time-saving conveniences for drying out the canal, preparatory to its medication by the iridio-platinum Dresser.

Canal Dressers, iridio-platinum, knurled handles, nickeled, each	75 cents.
" " Nos. 18 and 19, steel " " "	25 "

DR. W. H. DUDDY'S

NAPKIN HOLDER AND CLAMP.

Patent applied for.

FIG. 1.

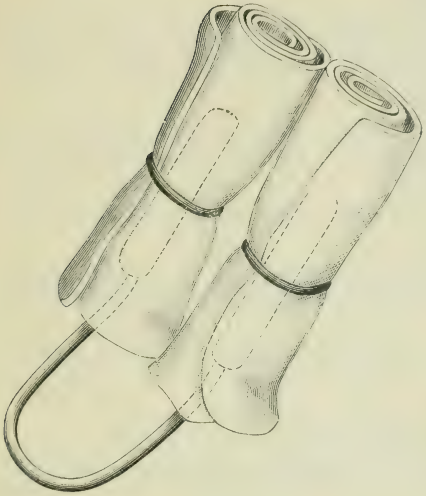


FIG. 2.

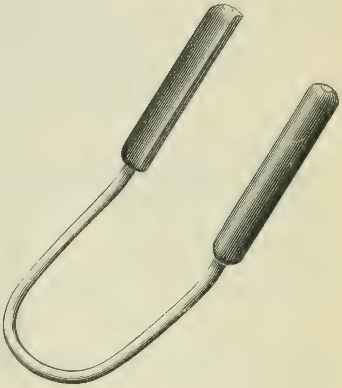


Fig. 1 shows the Holder with the napkin ready for use. Fig. 2 is the Holder, made of nickel-plated steel wire, with the ends covered with hard rubber. These illustrations are full size.

The napkins as shown in the cut are 3½ inches long and 2 inches wide, cut from cottonoid, a form of the most perfectly absorbent cotton.

The cottonoid is sold in sheets 12 inches long and 3½ inches wide, put up in ¼ lb. boxes. This quantity is enough for 200 napkins.

This Napkin Holder is designed principally for use on the posterior portion of the inferior maxilla while inserting temporary fillings, or treating teeth ; although it can be used advantageously on the superior maxilla also. The wire should rest on the gum back of the last molar tooth, and the napkin should be forced well down on the lingual surface of the maxilla in order to compress numerous sublingual ducts and prevent the free flow of saliva.

The napkins can be rolled any size on an excavator handle, and then easily slipped over the ends of the holder.

Price, Napkin Holder	each	$0.40
" ¼ lb. box Cottonoid	"	.25

PYORRHEA ALVEOLARIS.

WHAT IS PYORRHEA ALVEOLARIS?

A more or less general formation of pus about the roots of the teeth exuding from beneath the free edges of the gums.

WHAT IS ITS CAUSE?

Systemic predisposition, combined with decided induration of tooth-tissue or other local irritant (sanguinary calculus, caries or necrosis of process edge, gum pouches).

WHAT IS ITS TREATMENT?

If possible, thorough removal of all local possibilities for irritation, together with astringent, detergent and stimulant medication (zinc chloride, zinc iodide, carbolic acid and caustic potassa, dilute sulphuric acid, peroxide of hydrogen).

WHAT IS THE PROGNOSIS?

Possible amelioration of greater or less duration; *probable* recurrence of trouble, with usually gradual but persistent re-establishment of previous condition.

Flagg & Inglis "Dental Pathology and Therapeutics."

The use of Seabury's saturated solution of WHITE OAK BARK will absolutely prevent a recurrence or re-establishment of pyorrhea alveolaris.

It is a standard preparation, and may be used as a GARGLE full strength, without any ill effects.

12-oz. bottle, price	$1.00;	per dozen	$8.00
6-oz. " "	.50;	" "	4.00
2-gallon jug, price per jug			8.00

TRADE SUPPLIED BY

THE S. S. WHITE DENTAL MFG. CO.

OAKLAND HYDROGEN DIOXIDE, U. S. P.

is an official solution of H_2O_2, of definite strength and uniformity, free from excessive acidity, and will keep at ordinary temperatures from four to six months uncorked. Highly concentrated solutions, 25% or stronger, can be made in a saucer or porcelain evaporating dish by slowly evaporating a given quantity at not above 175° F. over a sand bath. Any gentle heat that will not agitate the solution will suffice. As the quantity decreases the strength increases. Thus, four ounces of a three per cent. solution evaporated to one ounce gives practically 12%, and eight ounces reduced to one ounce gives a product of 24%, etc. The solution is free from dangerous pressure, and will keep from four to six months after being uncorked. Pound bottles retail at 75 cents.

THE OAKLAND CHEMICAL CO.,

89 and 91 South Fifth Avenue, New York.

Sample, and monograph containing full instructions for use, free on receipt of 15 cents to prepay express charges.

DENTAL RUBBERS.

Bow-Spring Rubber.

Made just as it has been for twenty years, and just as worthy of its place as the leading high-grade rubber of the world. It is cheaper than others because it takes more sheets to make a pound, and because on account of its greater strength it can be made into thinner plates.

Trade-Mark No. 1847. Registered June 23, 1874.

Sold in Thick (*ordinary*) *or Thin sheets. In ordering, state which is wanted. We send the "Regular" or Thick, unless otherwise ordered.*

PRICES.

Less than 5 lbs. . .	per lb. $2.75	In 10-lb. lots . .	per lb. $2.25
In 5-lb. lots . .	" 2.50	In 25-lb. lots . .	" 2.00

S. S. White's Dental Gum, No. 1 Improved.

Of a somewhat lower grade than Bow-Spring, requiring less care in vulcanizing, but carefully and properly made so as to produce plates of great strength.

PRICES.

Less than 10-lb. lots	per lb. $2.25	In 25-lb. lots . .	per lb. $1.90
In 10-lb. lots . .	" 2.00		

The S. S. White Dental Mfg. Co.'s Pink Rubber.

Equal in desirable qualities—color and toughness—to the best of the higher-priced brands. Put up in half-pound boxes.

PRICES.

Less than 5 lbs. . .	per lb. $5.00	In 10-lb. lots . .	per lb. $4.50
In 5-lb. lots . .	" 4.75		

The S. S. White Dental Mfg. Co.'s Pink Rubber, "A."

Of a more delicate shade of coloring than the regular Pink.

PRICES.

Less than 5 lbs. . .	per lb. $5.00	In 10-lb. lots . .	per lb. $4.50
In 5-lb. lots . .	" 4.75		

The S. S. White Dental Mfg. Co.'s White Rubber.

Price	per lb. $4.00

The S. S. White Dental Mfg. Co.'s Black Rubber.

Price	per lb. $2.25

Poulson's Pink Rubber.

Price	per lb. $5.50

We also sell all other makes of rubbers at manufacturers' prices.

HOLLINGSWORTH'S SYSTEM

. . of . .

Crown and Bridge=Work

Patented Dec. 15, 1892;
July 24, 1894.

Simplicity of Method,

Perfection of Results,

and adaptability to every class of Crown= and Bridge=Work are characteristics of this system.

Following the plain directions, the dentist will find no difficulty in arriving at accurate and artistic results. By the Hollingsworth System the following operations are performed with greater ease than by any other method:

- GOLD CROWNS FOR MOLARS AND BICUSPIDS.
- GOLD CROWNS FOR INCISORS AND CUSPIDS.
- SOLID GOLD CUSPS.
- PORCELAIN FACINGS.
- FACING FOR ALL-GOLD BRIDGES.

The Cut on the opposite page *shows the folding case containing Cusp and Crown forms as put up for sale.*
Figures A to F show the simple appliances required.

Price of Set No. 1,
$25.00

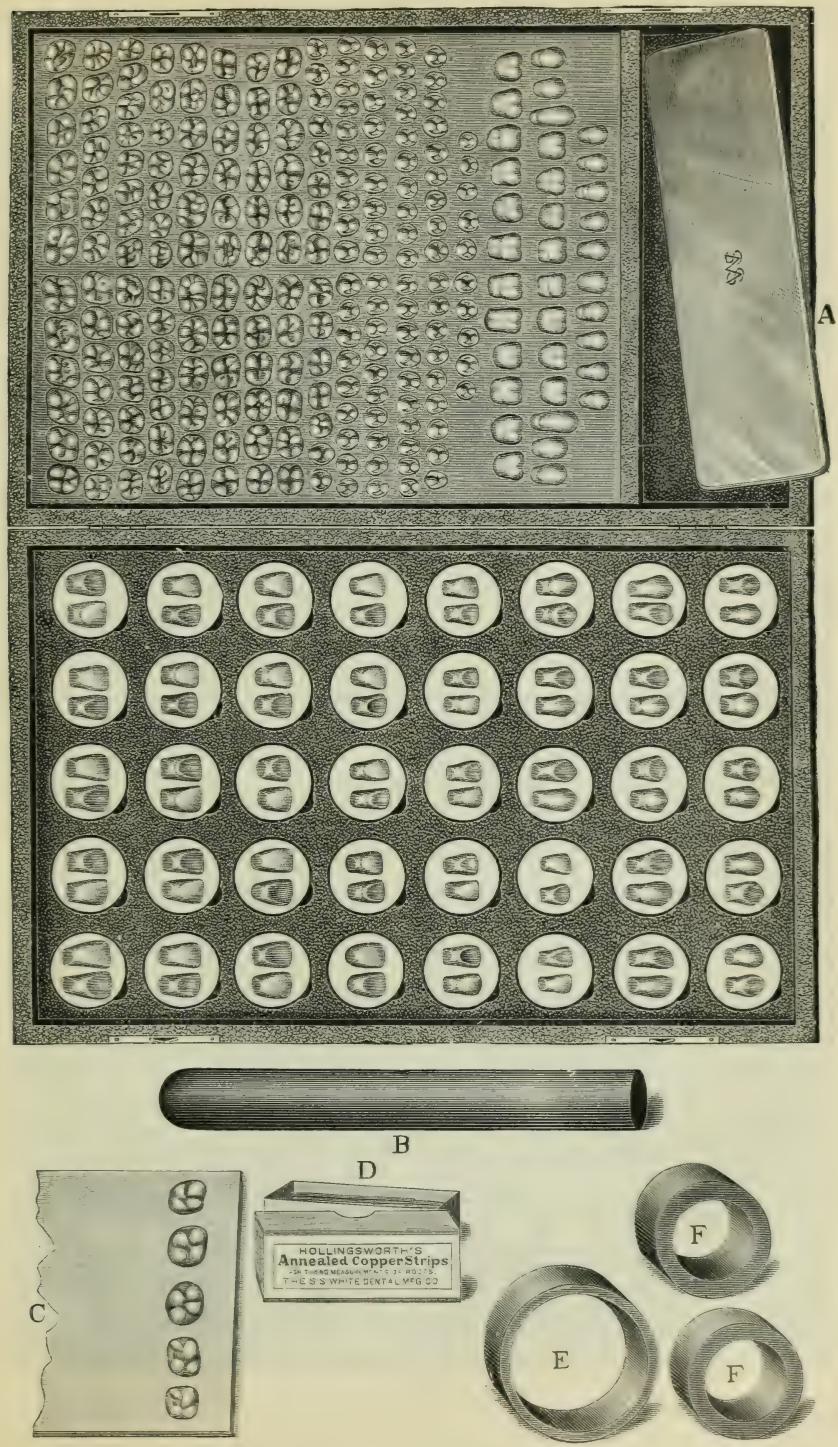
Directions for every detail of the process accompany each set.

Send for our

Crown= and Bridge=Work pamphlet (FREE)

which contains much valuable information in the various methods of Crowning Teeth.

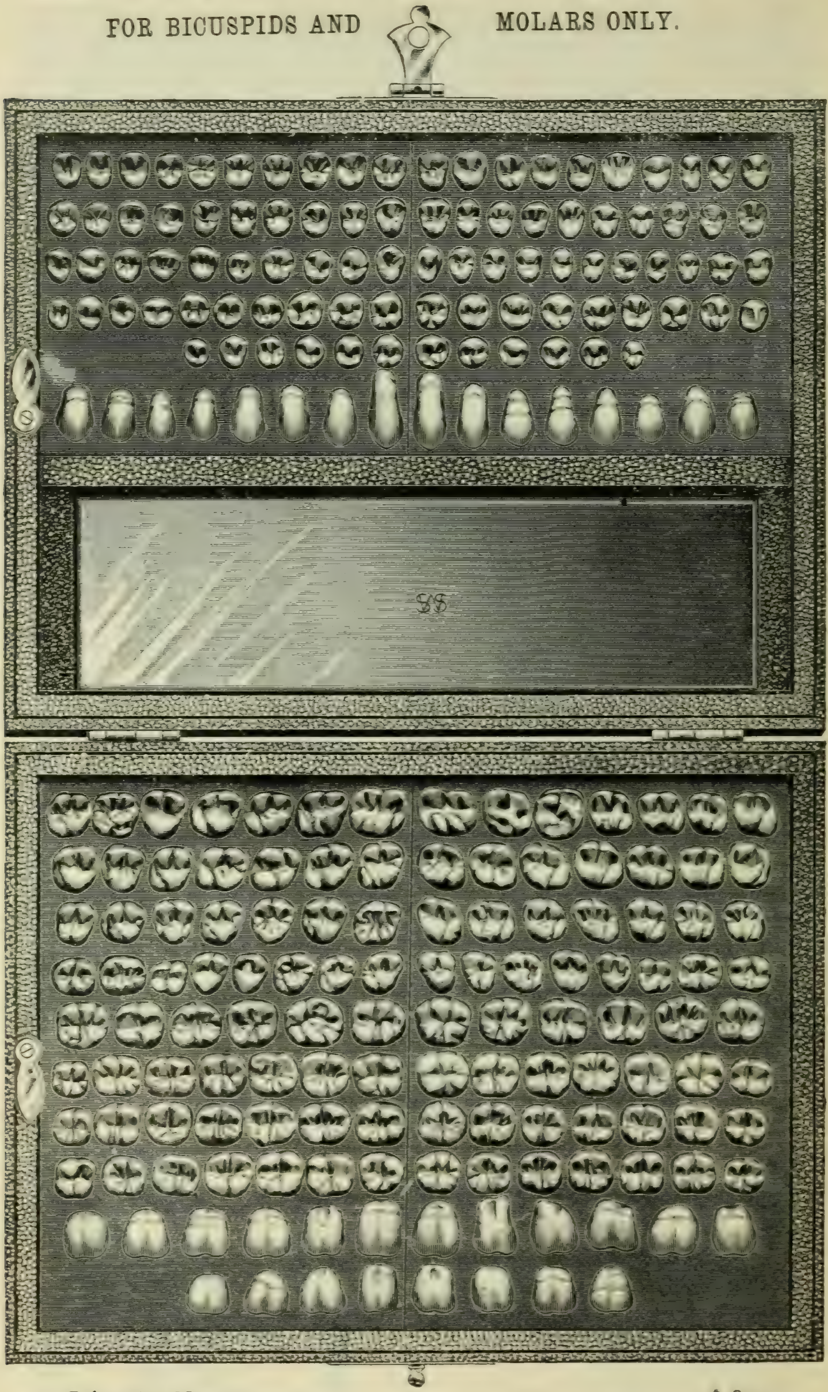
APPLIANCES FOR
Hollingsworth's Crown- and Bridge-Work System, Set No. 1.


A
B
C
D
HOLLINGSWORTH'S
Annealed CopperStrips
FOR TAKING MEASUREMENTS OF ROOTS.
THE S.S. WHITE DENTAL MFG CO
E
F
F

APPLIANCES FOR

Hollingsworth's Crown- and Bridge-Work System, Set No. 2.

FOR BICUSPIDS AND MOLARS ONLY.

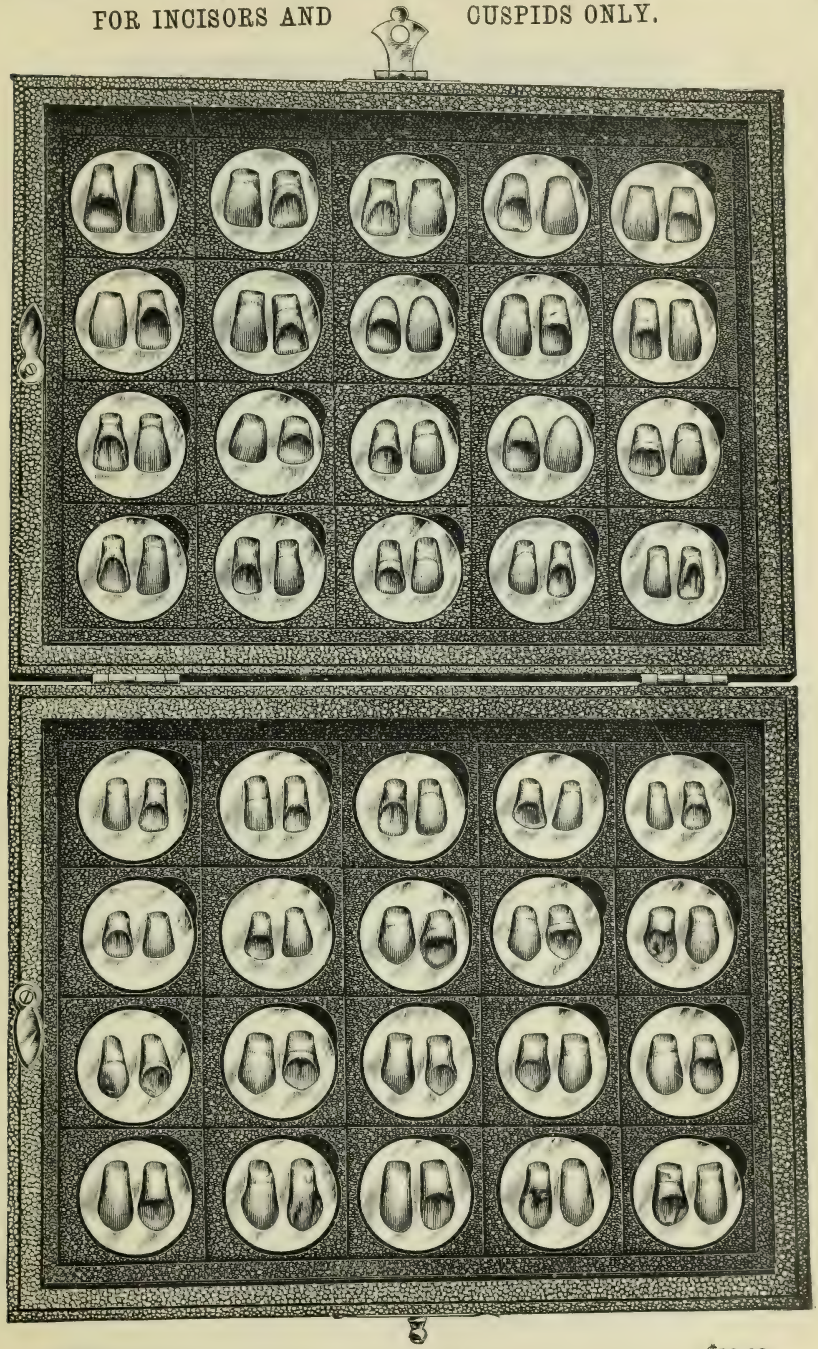


Price, Set No. 2 . . : $18.00

APPLIANCES FOR

Hollingsworth's Crown- and Bridge-Work System, Set No. 3.

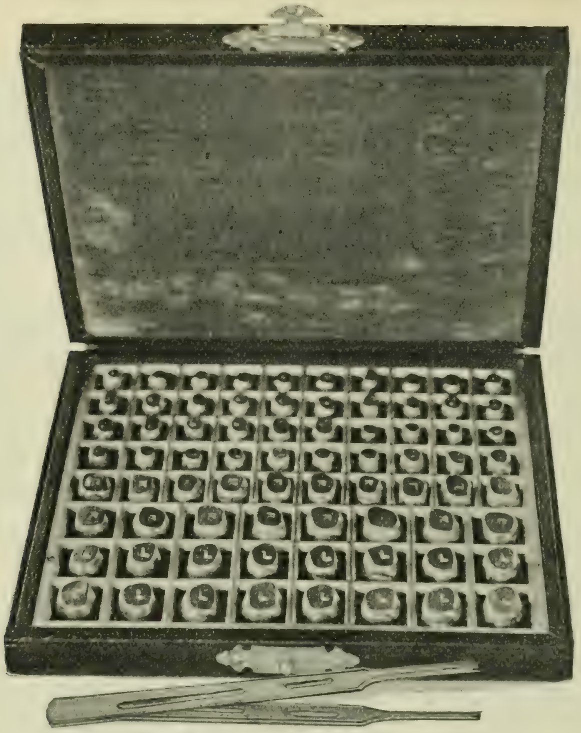
FOR INCISORS AND CUSPIDS ONLY.



Price, Set No. 3 . . . . $12.00

Hollingsworth's Contouring System.

Patented July 24, 1894.



Following the lines of precision exemplified in his crown- and bridge-work system, Dr. Hollingsworth devised a method of contouring gold crowns which unerringly gives the body of the crown a correct, natural shape corresponding with the other teeth in the mouth. It consists in forcing the crown to a selected form copied from nature. To meet the needs of practice, 72 of these forms are provided for bicuspids and molars. They are of metal, nickel-plated, and comprise the body of the tooth-crown, that is, the section between the neck and the point where the crown begins to round off into the cusps. The contouring is done after the band is fitted to the root but before the cusp cap is soldered on. The band is held in a block of wood so as to prevent interference with the shape of the fitted neck, and the selected form is forced into it with a small screw-press. The result is an artistically contoured crown every time.

The method can be utilized in almost any system of gold crown construction.

The set consists of 72 Contouring Forms in Folding Case, 1 Pair Pliers, 1 Screw-Press, 5 Hard-wood Blocks.

Price, complete	$12.00

Directions for Using Hollingsworth's Contouring System.

To contour a band without changing its shape at the gum-line, place the outer edge of the band in the slotted ends of the pliers furnished with the set (Fig. 1, E). Heat the band in the flame, and immediately burn that portion of the band that fits the neck of the tooth a short distance into the wood block, which will form a matrix, preventing the neck of the band from enlarging or changing form (Fig. 2, E). Select the suitable contouring form (Fig. 3, E) and press into the band the desired depth with the screw-press (Fig. 4, E). Finish the crown by any of the known methods.

FIG. 1, E.

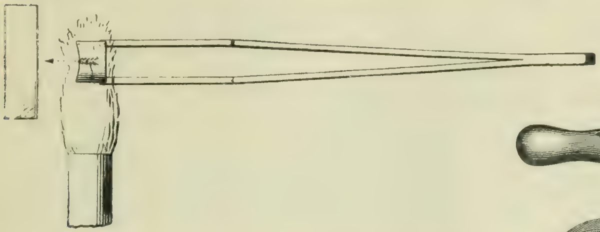


FIG. 4, E.

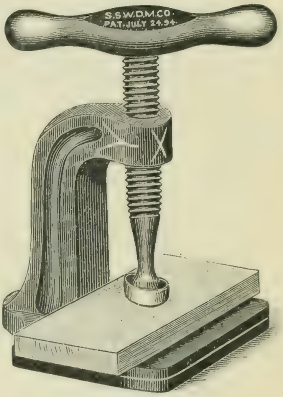
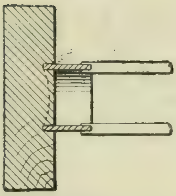

S.S.W.D.M.CO.
PAT. JULY 24.94.

FIG. 3, E.

FIG. 2, E.



If the Hollingsworth system is used, place the band on the tooth or root, and cut the band on the line where the teeth begin to turn to form the cusps. Select a cusp-button from the set of crown- and bridge-work appliances, and proceed according to directions heretofore given.

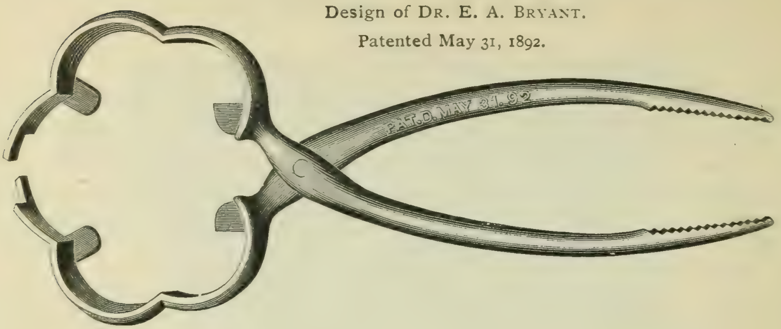
If it is desired to contour a band to a neat fit between the adjacent teeth, different forms can be tried on the cast or in the mouth until the proper size and shape is found; but it must be remembered that the band, after contouring, will be larger than the form on the outside by the thickness of the gold, so in trying a form wrap around it a piece of paper or thin cardboard of the thickness of the gold in the band. The paper is to be removed when contouring, so as to make the finished band of the size of the form plus the paper.

NOTE.—If the cusp selected does not cover the end of the band at all points, turn or pinch the edges of the band inward or outward when necessary, to make it fit.

FLASK LIFTER AND HOLDER.

Design of Dr. E. A. Bryant.

Patented May 31, 1892.



This is a new and most convenient tool for the laboratory.

The cut is little more than one-third the actual size. The serrated ends of the handles are perfectly adapted for lifting the flask from the vulcanizer, and the clamp end holds any size or form of flask, while fastening the screws, or for other manipulation. It is neatly finished, and heavily japanned to prevent rusting.

Price . . . . $0.65 each.

SPYER'S ADHESIVE PLATE.

(Patent Applied For.)

FOR UPPER AND LOWER DENTURES.

Air-Chamber Not Necessary.

Inventor of the Automatic Suction Cavity. Inventor of the Soft Rubber Dental "Blanks."

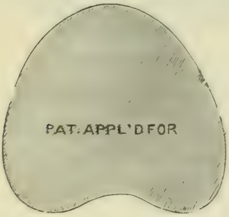


Fig 1. Spyer's Adhesive Plate for Upper Dentures.

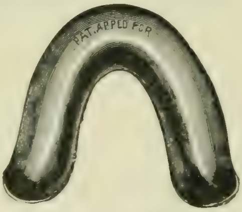


Fig. 2. Spyer's Adhesive Plate for Lower Dentures.

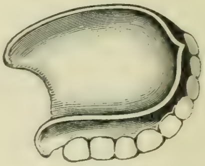


Fig. 3. Finished Denture with Adhesive Plate.

The principal advantages in the use of Spyer's Adhesive Plate are:

The method of using is simple in the extreme, and readily learned by any dentist from the plain directions which accompany each box.

The denture adheres firmly in any mouth, hard or soft, deep or flat.

It imparts a soothing sensation to the gums and mucous membrane, prevents irritation, and keeps the mouth in a healthy condition.

The close adhesion of the denture prevents the ingress of food particles between the plate and gums.

Mastication is performed with ease and comfort because the plate is not displaced during the process.

Old dentures can be readily fitted with the Adhesive Plate by following the directions.

After once using the Adhesive Plates you will always want them.

$1.00 a Box, each box containing six, put up as follows: No. 1, containing 3 upper and 3 lower; No. 2, containing 6 upper; No. 3, containing 6 lower.

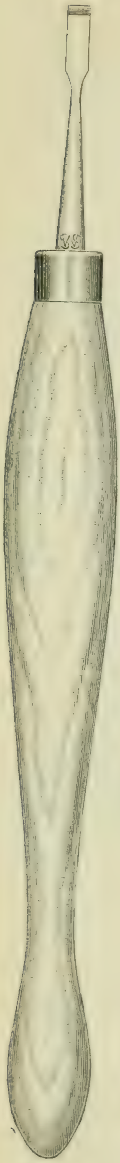
Many unsolicited testimonials received, of which the following is an example:

"Inclosed find check for $1.00, for which send me by return mail one box of your Adhesive Plates. Used them in mouth that would not hold an ordinary rubber plate at all. Now, with your Adhesive Plate, patient wears teeth with comfort."—O. E. Mickel, *Haverhill, Mass.*

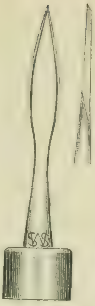
Can be had at all dental depots, and of the inventor and manufacturer.

JOSEPH SPYER, D.D.S.,
182 Broadway, New York City.

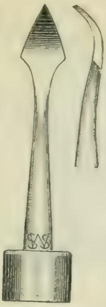
FINE VULCANITE FINISHERS.



21



22



23

The small set of cute little tools illustrated, comprises three new numbers. No. 21 is a thin narrow chisel for paring the labial surfaces, margins, and edges of a vulcanite (or cast) plate. No. 22 is a pointed side-cutting tool for carving smoothly between the teeth; the parts most difficult to shape and finish. No. 23 is for palatal and generally efficient work. The thoughtfully designed handles, such as we have had for years on the Kingsley Finishers, afford a firm non-cramping grasp, and taken altogether, this finishing set will be found to pleasingly supplement the preparatory work of the burs, files, and scrapers.

PRICE.

Fine Vulcanite Finishers, Nos. 21, 22, and 23, each 30 cents.

ABRADA.

A NEW POLISHING MATERIAL,

CONVENIENT AND EFFECTIVE.

Made in four grades, each specially adapted to its particular line of work.

No. 1 Fine, for Polishing Vulcanite.
No. 2 Medium, for Grinding Vulcanite
No. 3 Fine, for Polishing Metals.
No. 4 Medium, for Grinding Metals.
The Polishers won't scratch.
The Grinders will do rapid work.
Put up in oval sticks 4 inches long.

The polishing wheel is charged by holding the stick of Abrada against it.

PRICES.

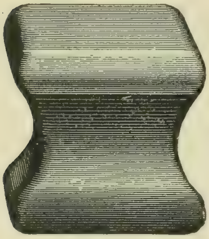
Nos. 1 and 2	each	$0.15
" 3 " 4	"	.25
In box of four		.70

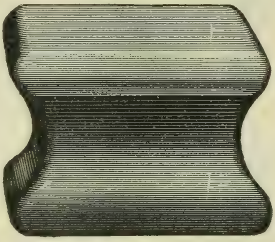
SOFT RUBBER BITE-BLOCKS.

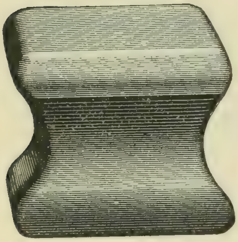
Patterns supplied by Dr. S. H. Guilford.

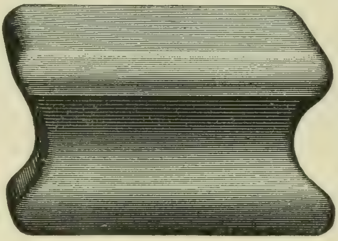
The four Soft Rubber Bite-Blocks illustrated herewith, besides affording a variety of sizes sufficient to cover all requirements, have the following advantages :

1. Being elastic, they cannot injure the frailest tooth by being bitten upon.


1


3


2


4

2. Their resilience will open the jaws, if partially closed, as soon as muscular relaxation takes place.

3. Being grooved, they cannot fall into the mouth or be pressed out of place by the tongue.

4. They are too large to pass back into the pharynx or be swallowed, and they cannot be broken or injured by biting.

5. They do not need to have a string attached to them, and are readily removed with a crooked finger.

6. Each block can be set at two heights, and can be placed at any point between the jaws without likelihood of slipping.

Price . . . . each 25 cents.

DR. PARR'S HARD WAX FLUX,

For Attaching Clasps and Teeth in Plate- and Bridge-Work.

This material was formerly well known as Wax Cement. It is quite hard, and will have to be taken from the box with a hot spatula. It sets quickly and holds the teeth and clasp firmly for trial in the mouth and during subsequent soldering. Then the wax, throughout which the flux is distributed, is readily burned or melted out, leaving the flux as a deposit over the crevices and surfaces to be joined, much like the rime on the grass of a frosty morning, ready to perform its office in the soldering.

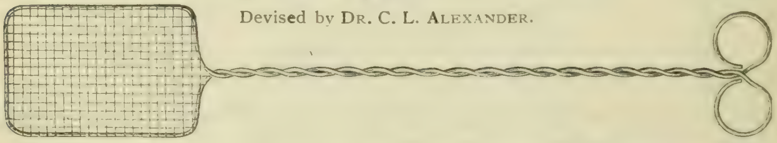
Put up in enameled metal boxes.

Price . . . . per box 50 cents.

WIRE SOLDERING FRAME.

FOR CROWN- AND BRIDGE-WORK.

Devised by Dr. C. L. Alexander.



Place the crown to be soldered on the Wire Frame and hold over the Bunsen flame, which will pass through the meshes and all around the crown to quickly and evenly solder it without changing its shape.

A small bridge piece may be invested on the Frame for heating up and soldering, which the long handle comfortably facilitates. Other uses of the device will readily suggest themselves.

PRICE.

Wire Soldering Frame . . . . . . each 15 cents.

DENTISTS' PLASTER.

For Taking Impressions and Making Casts.

THE S.S. WHITE DENTAL M'F'G CO.
PHILADELPHIA.
NEW YORK.
BROOKLYN.
BOSTON.
CHICAGO.
ATLANTA.
DENTAL PLASTER
Dentists Impression Plaster
THE S.S. WHITE DENTAL M'F'G CO.

Our Dentists' Plaster has two points of superiority: Quality and honest dealing. Its quality needs no exploiting. It is known. With regard to the other point, a word may not be out of place. For a barrel we sell 300 lbs.; for a half-barrel, 150 lbs.; for a quarter-barrel, 75 lbs. The packages are never less, frequently more, and then the buyer gets the advantage. Our cans are packed by machinery, and contain the quantity they are advertised to contain every time; they have the name, etc., stamped in the lid as shown.

PRICES.

Two-Quart Can	$0.30	Three-Peck Can	$2.00
Six-Quart Can	.70	Quarter-Barrel	1.60
Twelve-Quart Can	1.15	Half-Barrel	2.50
Half-Bushel Can	1.45	Barrel	3.50

These are the prices at Philadelphia. Freight and expenses added when sold at other depots. Boxing on cans, and porterage, extra.

CHARLES ABBEY & SONS,

MANUFACTURERS OF

DENTISTS' FINE GOLD FOIL,

Nos. 228 and 230 Pear Street, Philadelphia.

The attention of Dentists is invited to our FINE GOLD FOIL, which is prepared under our constant personal supervision. Our Nos. are 4, 5, 6, and 8.

We are also manufacturing COHESIVE FINE GOLD FOIL, Nos. 4, 5, and 6.

ALL our Gold Foil is manufactured from ABSOLUTELY PURE GOLD, prepared expressly for the purpose, with great care, by ourselves.

ADDRESS CHARLES ABBEY & SONS, Philadelphia.

Detroit College of Medicine—Department of Dental Surgery.

DETROIT, MICH.

Established 1891.

Member of National Associated Faculties and recognized by the National Board of Examiners.

The Fifth Annual Session will begin ***September 24, 1895, and continue nine months.*** **The new College building is now finished, furnished and completely equipped in all departments.**

Three full courses of study of nine months each are required for graduation.

FEES.

Matriculation	$5.00
Regular Course	50.00
Graduation	30.00

A perpetual ticket (not transferable), good for three or more courses, will be issued for $125.
For full particulars and annual announcement, address

DR. H. O. WALKER, Secretary, No. 27 Adams Avenue, East,
or, G. S. SHATTUCK, Professor in charge, Detroit College of Medicine, Detroit, Mich.

FOR SALE,

A profitable dental practice in a healthy Southern locality. Satisfactory reasons for selling. No one need apply without the best credentials as to ability and character. Six hundred dollars in cash and six hundred dollars on easy terms will buy practice and a first-class office outfit. I will remain in office one month, if desired, and introduce purchaser. Correspondence confidential. Address "X. Y. Z.,"

Care The S. S. White Dental Mfg. Co.,
Atlanta, Ga.

FOR SALE.

I will sell my business, which nets me a clear profit of $10,000 a year, and has done so for the past fifteen years, in a large city close to New York. Will give a long lease on property to the right party. Address

F. C. Harmstad,
Mgr. The S. S. White Dental Mfg. Co.,
1 and 3 Union Square, West, New York City.

OFFICES FOR RENT.

Four suites of roomy offices, suitable for dentists, have been fitted up in house No. 1633 Locust street. Steam heat. Good northern light in each suite; sanitary plumbing. Desirable location. For further information, apply to

Wm. Alexander Brown,
1631 Locust St., Philadelphia.

FOR RENT,

The home and office (former completely, latter furnished except chair and engine) of a high-class dentist who occupied the same as before mentioned for eighteen years. The most central and charming Brooklyn location. $75 per month. Address "S. D. H.,"

Brooklyn P. O., N. Y.

WANTED.

Any dentist, having at his command a few thousand dollars, desiring to locate in the healthful climate of Colorado for the practice of dentistry or any other enterprise, or desiring to invest in the gold-mining industry which is becoming so profitable, communicate with Drs. Hayden & Townsend, Colorado Springs, Col., at once.

REMOVAL NOTICE.

Dr. G. LENOX CURTIS, 30 West 59th Street (opposite Central Park),
NEW YORK CITY.

Graduate of both the Medical and Dental Departments of the University of Pennsylvania.

Practice confined exclusively to *Oral, Facial, and Nasal Surgery.*

CROWN- AND BRIDGE-WORK INSTRUCTION.

The undersigned is prepared to give thorough instruction to dentists desiring to perfect themselves in practical crown- and bridge-work.

Realizing a demand for well-made show-pieces of bridge-work, I can supply the profession with the same in any form from single crowns to full-mounted models.

For particulars and prices address

H. W. Northrop, D.D.S.,
510 Fifth Ave., New York City.

St. Louis Medical College.—Missouri Dental College.

Departments of Washington University.

Session begins September 28, 1894, and ends April, 1895. Our laboratories are well equipped and admirably adapted for the comfort and instruction of 400 students. Our Dental Infirmary offers unequaled opportunities for the finest work.

Our clinical facilities in medicine are of the best, and include out clinics, private hospitals, and a full share of the work in the city institutions.

Many years' experience as an advanced school of high standard has perfected the three years' graded course.

Apply at the College Building, 1806 Locust St.

HENRY H. MUDD, M.D., Dean.

I. D. C.

18th Annual Session.

New Building, constructed by us, especially for Dental Education.

CLINICS UNSURPASSED.

INDIANA DENTAL COLLEGE,

Send for Catalogue. Indianapolis, Ind

The Carpenter Post-Graduate and Practitioners' School of Prosthetic and Practical Dentistry.

SECOND YEAR OPENS OCT. 1, 1895.

Students received at any time.

Come to the Exposition, and get the Practitioners' Course at the same time. For full particulars, address

DR. L. D. CARPENTER,

47½ Whitehall Street, Atlanta, Ga.

UNIVERSITY OF MICHIGAN.

COLLEGE OF DENTAL SURGERY.

The 21st annual session begins October 1, 1895, and closes June 27, 1896.

The preliminary examination will be held Monday, September 30, 1895.

Three full courses of study of nine months each are required for graduation.

The fees, which must be paid in advance each year, are for non-residents of Michigan, $65 first year, $40 second year, and $50 third year. These fees cover all expenses of tuition, but not of materials used in laboratory courses.

The annual announcement containing full particulars will be sent to any one addressing a request to J. TAFT, Dean, Ann Arbor, Mich.

Louisville College of Dentistry.

DENTAL DEPARTMENT OF THE CENTRAL UNIVERSITY OF KENTUCKY.

SPRING AND SUMMER SCHOOL.

Course opens January 2, and continues six months. For Catalogue and particulars, address

P. RICHARD TAYLOR, M.D., Dean,
324 East Chestnut St. Louisville, Ky.

Hospital College of Medicine

AND INFIRMARY.

Medical Department of the Central University of Kentucky.

SPRING and SUMMER SCHOOL.

Sessions held at the same time as those of the Dental Department.

Course opens Jan. 2, and continues six months.

For Catalogue, address

P. RICHARD TAYLOR, M.D., Dean,
LOUISVILLE, KY.

DENTAL DEPARTMENT

OF THE

Marion-Sims College of Medicine,

COR. GRAND AVE. AND CAROLINE STREET,
ST. LOUIS, MO.

The Session of 1895-96 begins September 24, 1895, and ends April 24, 1896. Three full courses of study are required before graduation.

FEES FOR THE ENTIRE TERM ARE $85.00.

FACULTY.

Y. H. BOND, Dean.
J. H. KENNERLY, D.D.S., Secretary, Professor of Mechanical Dentistry.
L. A. YOUNG, M.D., D.D.S., Professor of Operative Dentistry.
C. C. COWDERY, D.M.D., Professor of Dental Materia Medica and Therapeutics.
P. F. HELLMUTH, A.M., M.D., D.D.S., Professor of Dental Pathology and Orthodontia.
J. C. CHISHOLM, Professor of Crown- and Bridge-Work.
J. P. HARPER, Professor of Operative Technics.
W. L. WHIPPLE, Professor of Dental Anatomy.
JACOB GEIGER, M.D., Professor of Surgery.
HUGO SUMMA, A.M., M.D., Professor of Pathology.
O. E. TREUTLER, Ph.G., M.D., Professor of Chemistry and Materia Medica.
A. H. MEISENBACH, M.D., Professor of Surgery.
A. C. BERNAYS, A.M., M.D., M.R.C.S.E., Professor of Anatomy.
T. C. WITHERSPOON, M.D., Professor of Physiology.
LOUIS CRUSIUS, M.D., Professor of Histology.
GEO. TANSEY, B.L., Professor of Dental and Medical Jurisprudence.
GEO. G. CRANDALL, M.D., Lecturer on Bacteriology.
E. H. SPOONER, M.D., Lecturer on Physics.

For further information and announcement, address

J. H. KENNERLY, Secretary,
303 N. Grand Avenue.

Y. H. BOND, Dean,
Grand and Page Avenue.

Harvard University, Dental Department.

BOSTON, MASS., 1895-96.

FACULTY.

CHARLES W. ELIOT, LL.D., President.
THOMAS H. CHANDLER, D.M.D., Dean, and Professor of Mechanical Dentistry.
J. COLLINS WARREN, M.D., Professor of Surgery.
HENRY P. BOWDITCH, M.D., Professor of Physiology.
THOMAS DWIGHT, M.D., Professor of Anatomy.
THOMAS FILLEBROWN, M.D., D.M.D., Professor of Operative Dentistry.
WILLIAM B HILLS, M.D., Assistant Professor of Chemistry.
CHARLES MINOT, M D., Professor of Histology.
HAROLD C. ERNST, M.D., Assistant Professor of Bacteriology.
CHARLES A. BRACKETT, D.M.D., Professor of Dental Pathology.
EUGENE H. SMITH, D.M.D., Instructor in Orthodontia.
EDWARD C. BRIGGS, M.D., D.M.D., Assistant Professor of Materia Medica and Therapeutics.
JERE E. STANTON, M.D., D M.D., Instructor in Oral Anatomy, Physiology, and Bacteriology.
WILLIAM P. COOKE, D.M.D., Instructor in Crown- and Bridge-Work.

OTHER INSTRUCTORS.

FOREST G. EDDY, D.M.D., Instructor in Operative Dentistry.
GEORGE H. MONKS, M.D., Instructor in Surgical Pathology.
GEORGE L. WALTON, M.D., Instructor in Neurology.
EZRA F. TAFT, D.M.D., Instructor in Operative Dentistry.
FREDERICK S. HOPKINS, D.M.D., Instructor in Operative Dentistry.
DWIGHT M. CLAPP, D.M.D., Clinical Lecturer in Operative Dentistry.
EDWIN C. BLAISDELL, D.M.D., Instructor in Operative Dentistry.
HENRY W. GILLETT, D M.D., Instructor in Operative Dentistry.
WILLIAM H. POTTER, D.M.D., Clinical Lecturer in Operative Dentistry.
WALDO E. BOARDMAN, D.M.D., Instructor in Operative Dentistry, and Curator of Museum.
FREDERICK BRADLEY, D.M.D., Instructor in Operative Dentistry.
HENRY L. UPHAM, D.M.D., Instructor in Operative Dentistry.
ARTHUR H. STODDARD, D.M.D., Instructor in Mechanical Dentistry.
ELLIS P. HOLMES, D.M.D., Instructor in Operative Dentistry.
CHARLES E. PERKINS, D.M.D., Instructor in Operative Dentistry.
PATRICK W. MORIARTY, D.M.D., Demonstrator of Mechanical Dentistry.
THEODORE HALLETT, D.M.D., Instructor in Mechanical Dentistry.
HARRY SNOW PARSONS, D.M.D., Instructor in Operative Dentistry.
HARRY O. BIXBY, D.M.D., Instructor in Mechanical Dentistry.
FRANK T. TAYLOR, D.M.D., Instructor in Operative Dentistry.
ARTHUR W. ELDRED, D.M.D., Instructor in Mechanical Dentistry.
JOSEPH J. PAUL, D.M.D., Demonstrator of Operative Dentistry.
ARTHUR J. OLDHAM, D.M.D., Instructor in Mechanical Dentistry.
NATHAN P. WYLLIE, D.M.D., Assistant Demonstrator of Operative Dentistry.

The Twenty-seventh Annual Session of this school begins Sept. 24, 1895, and ends June 24, 1896, with a recess of one week at Christmas, and another in April, making a school-year of nine months of practically continuous work.

General Anatomy, by Dr. Thomas Dwight; *Physiology*, by Dr. H. P. Bowditch; *General Chemistry*, by Dr. Wm. B. Hills; *Histology*, by Dr. Minot; and *Bacteriology* by Dr. Harold C. Ernst, together with ample dissecting under able demonstrators, are the studies of the first year, and are identical with those of the Harvard Medical School. The studies for the second year are Operative and Mechanical Dentistry, Crown- and Bridge-Work, Materia Medica and Therapeutics, and Oral Surgery Of the third year the studies are Operative and Mechanical Dentistry, Orthodontia, and Surgical Pathology. Attention is called to the fact that *twenty seven months* of progressive instruction compose the required three years in the school.

All applicants for advanced standing must pass the examinations of the years they desire to omit, or furnish proof that they have passed *equivalent* examinations.

At the end of each year written and oral examinations test the student's knowledge, and he must pass satisfactorily in a majority of the studies of each year before he can pass on to the next year's class.

To those wishing to take the medical degree the studies taken in the first year of this school are allowed in the Medical School of the University. after passing the required entrance examinations.

The University Degree, D.M.D. (*Dentariæ Medicinæ Doctor*), is conferred upon all who fulfill the requirements.

Graduates of recognized dental schools will be admitted to the courses of Operative and Mechanical Dentistry on payment of $50 each, or $100 for both, for the whole or any portion of the academic year.

FEES.

There are no fees for matriculation, nor for the diploma, nor for the demonstrators. For the first year the student is a member of the school the fee is $200, payable in two installments of $120 and $80; for the second year, $150, in two payments of $100 and $50; for any subsequent year, $50. For information and announcements, address

THOMAS FILLEBROWN, Secretary,
157 Newbury Street, Boston, Mass.

PHILADELPHIA DENTAL COLLEGE
AND HOSPITAL OF ORAL SURGERY.

Cherry, above Seventeenth Street.

ANNOUNCEMENT.

THE COLLEGE YEAR begins with the Spring Session, March 1, which Session continues until the last day of May. The Winter Course commences October 1, and closes on the last day of February ensuing. A preliminary Fall Course opens September 1.

The Dispensary and Laboratory are open all the year, except during the summer vacation. Instruction in *Practical Dentistry* is a prominent feature of the institution. This work is under the supervision of an executive committee composed of the practicing dentists of the school, the members of which aided by competent Demonstrators, give special attention to the interests of students. The Dispensary consists of large, well-lighted rooms, furnished with comfortable operating-chairs, tables, and all conveniences. As an excess of patients is in attendance at the clinics, the opportunities here presented for acquiring a knowledge of clinical dentistry are ample and complete. The new laboratory is the largest of its kind in the country.

A clinic in *Oral Surgery* is held every Saturday at 12 M.

Graduation.—Attendance on three courses of Lectures and satisfactory examinations in theory and practice are required for graduation. **Graduates in Medicine** are eligible for graduation in Dentistry after attendance on Lectures and Clinical Service during two courses. These are excused from examination on Anatomy, Chemistry, Physiology, and Surgery.

Fees.—Tickets for each course, including the Demonstrator's, $100; Matriculation, inclusive of Syllabi for home study, $5 for each course; Examination and Diploma Fee, $25. Board, $4 to $6 per week.

Special Clinics, for the study and treatment of Diseases of the Teeth, are held twice weekly by Professors Flagg and Stellwagen, and on Crown- and Bridge-work Wednesdays and Fridays, at 8 A.M., by Professor Guilford.

Lectures on Descriptive Anatomy, by Dr. Boenning, are given Monday and Thursday evenings, at 8 o'clock.

Examinations. First Year.—Progress in Anatomy, Physiology, Anesthetics, and Anesthesia. Second Year.—Progress in Chemistry, Prosthetic and Operative Dentistry, and final in Anatomy, Physiology, and Anesthetics and Anesthesia. Third Year.—Final in Chemistry and Materia Medica, Practical, Prosthetic, and Operative Dentistry, and Dental Pathology and Therapeutics.

Graduation in Medicine.—Graduates in Dentistry desiring to take the Medical degree continue their studies in the Medico-Chirurgical College.

PRACTICAL REQUIREMENTS.

First Year (Freshman).—General plate-work in laboratory, and the preparation and filling of at least twenty-four cavities in extracted teeth with Tin foil, Gutta-percha, Zinc phosphate, and Amalgam. The cavities when prepared are to be shown to the demonstrators for criticism or approval, as also the fillings when completed. The best six of the entire number are to be mounted and deposited in the College museum. Any student failing to do the above work satisfactorily, will have his admission to the Junior Class conditioned on completion of it before the middle of the Junior term.

Second Year (Junior).—General plate-work and the making of the prescribed depositing plate, also the preparation of roots and the making and mounting of six dowel crowns, three hollow metal crowns, and a piece of bridge-work, including two or more suspended crowns, on teeth out of the mouth.

Third Year (Senior).—Making of practical case and the requisite graduation fillings. In special cases, subject to the approval of the Professor of Practice, a case of crown- or bridge-work (in the mouth) may be accepted in lieu of the practical plate. Hours for examination of practical work and graduation fillings, Mondays, Tuesdays, and Saturdays, from 10.30 A.M. to 12 M.

FACULTY.

HENRY MORTON, A.M., PH.D., Emeritus Professor of Chemistry.
S. H. GUILFORD, D.D.S., PH.D., Professor of Operative and Prosthetic Dentistry.
J. FOSTER FLAGG, D.D.S., Professor of Dental Pathology and Therapeutics.
HENRY I. DORR, M.D., D.D.S., Professor of Practice of Dentistry, Anesthetics, and Anesthesia.
S. B. HOWELL, M.D., D.D.S., Professor of Chemistry and Materia Medica.
THOMAS C. STELLWAGEN, M.D., D.D.S., Professor of Physiology.
JAMES E. GARRETSON, M.D., D.D.S., Professor of Anatomy and Surgery. Surgeon to the Oral Clinic.

DEMONSTRATORS.

DENTAL DEPARTMENT.

Practice of Dentistry	J. O. ROTHWELL, D.D.S. OTTO E. INGLIS, D.D.S.
Prosthetic Dentistry, Crown- and Bridge-Work	R. H. NONES, D.D.S. A. DEWITT GRITMAN, D.D.S.

ORAL SURGICAL DEPARTMENT.

Chief Assistant Oral Surgical Clinic	M. H. CRYER, M.D., D.D.S.
Demonstrator of Anatomy	HENRY C. BOENNING, M.D.
Assistants in Clinical Service	H. A. ICKES, D.D.S. ISIDORE LETT, D.D.S.

SCIENTIFIC DEPARTMENT.

Demonstrator of Materia Medica	L. GREENBAUM, M.D., D.D.S.
Demonstrator of Histology	E. B. SANGREE, M.D.
Demonstrator of Chemistry	H. H. BOON, M.D.

For announcements containing particulars, address

Dr. JAMES E. GARRETSON, Dean of the Faculty,
1537 Chestnut St., PHILADELPHIA.

University of California.

COLLEGE OF DENTISTRY,

Donohoe Building, Corner of Market and Taylor Streets,

SAN FRANCISCO.

FACULTY.

MARTIN KELLOGG, A.M., LL.D., President of the University, and *ex-officio* President of the Faculty.
JOSEPH LeCONTE, M.D., LL.D., Honorary Professor of Biology.
W. E. TAYLOR, M.D., Emeritus Professor of Surgery.
C. L. GODDARD, A.M., D.D.S., Professor of Orthodontia.
L. L. DUNBAR, D.D.S., Dean, and Professor of Operative Dentistry.
MAURICE J. SULLIVAN, D.D.S., Professor of Dental Pathology, Therapeutics, and Materia Medica.
WILLIAM B. LEWITT, M.D., Professor of the Principles and Practice of Surgery.
A. L. LENGFELD, M.D., Professor of Chemistry and Metallurgy.
A. A. D'ANCONA, A.B., M.D., Professor of Physiology and Histology.
JOHN M. WILLIAMSON, M.D., Professor of Anatomy.

LECTURERS, DEMONSTRATORS, AND ASSISTANTS.

W. F. SHARP, D.D.S., D.M.D., Lecturer on Mechanical Dentistry.
H. R. WILEY, A.B., Lecturer on Dental Jurisprudence.
CHARLES A. LITTON, D.D.S., Superintendent of Infirmary.
M. J. SULLIVAN, D.D.S., Instructor in Clinical Operative Dentistry.
HARRY P. CARLTON, D.D.S., Instructor in Operative Technic.
PAUL C. ERHARDT, D.D.S., Demonstrator of Operative Dentistry.
W. F. SHARP, D.D.S., D.M.D., Instructor in Clinical Mechanical Dentistry.
P. C. ERHARDT, D.D.S., Assistant in Operative Dentistry.
WALTER I. WILCOX, D.D.S., Demonstrator of Mechanical Dentistry.
JAMES W. LIKENS, D.D.S., Demonstrator of Operative Dentistry.
HAROLD L. SAEGER, D.D.S., Assistant Demonstrator of Mechanical and Operative Technic.
JOHN H. BARBAT, Ph.G., M.D., Demonstrator of Anatomy.
O. W. JONES, M.D., Assistant Demonstrator of Anatomy.
S. J. FRASER, A.B., M.D., Assistant Demonstrator of Anatomy.
J. D. HODGEN, D.D.S., Assistant in Chemistry and Metallurgy.
H. D. NOBLE, D.D.S., Demonstrator of Orthodontia Technic.
JAMES G. SHARP, D.D.S., M.D., Assistant to the Chair of Physiology and Histology.

CLINICAL INSTRUCTORS.

F. W. BLISS, D.D.S.	Santa Cruz
GEO. H. CHANCE, D.D.S., M.D.	Portland, Oregon
WARREN DeCROW	San Jose
H. HIPKINS, L.D.S.	San Francisco
A. O. HOOKER	San Jose
H. E. KNOX, D.D.S.	Oakland
W. F. LEWIS	Oakland
J. P. PARKER, D.D.S.	Santa Cruz
W. E. PRICE, D.D.S.	San Francisco
WM. B. SHERMAN, D.D.S.	San Francisco
MAX SICHEL	San Francisco
E. L. TOWNSEND, D.D.S.	Los Angeles
L. VAN ORDEN, M.D., D.D.S.	San Francisco
F. H. METCALF, D.D.S.	Sacramento

L. L. DUNBAR, Dean,
500 Sutter Street,
SAN FRANCISCO.

UNIVERSITY OF MARYLAND.

DENTAL DEPARTMENT.

N. E. COR. LOMBARD AND GREENE STREETS, BALTIMORE, MD.

Hon. SEVERN TEACKLE WALLIS, LL.D., Provost.

FACULTY.

FERDINAND J. S. GORGAS, M.D., D.D.S., Professor of Principles of Dental Science, Surgery, and Mechanism.

JAMES H. HARRIS, M.D., D.D.S., Professor of Operative and Clinical Dentistry.

FRANCIS T. MILES, M.D., Professor of Physiology.

L. McLANE TIFFANY, M.D., Clinical Professor of Oral Surgery.

RANDOLPH WINSLOW, M.D., Professor of Anatomy.

R. DORSEY COALE, PH.D., Professor of Chemistry and Metallurgy.

I. EDMONDSON ATKINSON, M.D., Professor of Materia Medica and Therapeutics.

JOHN C. UHLER, M.D., D.D.S., Demonstrator of Mechanical Dentistry.

ISAAC H. DAVIS, M.D., D.D.S., Demonstrator of Operative Dentistry.

I. HOLMES SMITH, M.D., } Demonstrators of Anatomy.
RIDGELY B. WARFIELD, M.D., }

The Principal Demonstrators are assisted by *sixteen* Assistant Demonstrators. Special Instructions are given in Continuous-Gum and Bridge-Work.

At stated times during the Annual Sessions a number of prominent dental practitioners will hold Clinics and deliver Clinical Lectures.

Each year since its organization has added to the reputation and prosperity of this University Dental School, until now its graduates, in almost every part of the civilized world, are meeting with the success that ability will ever command. The past session was the most successful one in number of matriculates ever held; and visiting dentists from all parts of this country have expressed themselves as being astonished and gratified at the ability shown by the students when operating upon patients in the Infirmary. Forming one of the departments of *one of the oldest Universities* in this country, its diploma is everywhere recognized and honored.

The instruction in both operative and mechanical dentistry is as thorough as it is possible to make it, and embraces everything pertaining to dental art. The advantages which the general and oral surgical clinics, to which the dental students are admitted, as indeed to all the lectures of the University, afford, cannot be overestimated. The many thousands of patients annually treated in the University Hospital, well known to be the largest Hospital in Baltimore, afford an abundance of material for dental infirmary and laboratory practice, and the oral surgery clinics.

The Infirmary and Laboratory practice for students is exceptionally large, a fact that adds so greatly to the facilities of this Dental School.

The Dental Infirmary and Laboratory Building is one of the largest and most complete structures of the kind in the world. The Infirmary is lighted by forty-seven large windows, and is furnished with the most improved operating chairs. It has again become necessary to enlarge the Dental Building, making an Infirmary nearly one hundred feet long, and a Laboratory eighty feet long and forty-three feet wide.

The Dental Infirmary and Laboratory are open daily (except Sundays) during the entire year for the reception of patients; and *the practice for dental students* has increased to such an extent that all the students during the past session have had an abundance of practical work in both operative and prosthetic dentistry. This means for practical instruction has already assumed such large proportions that the supply has been beyond the needs of the large classes in attendance during the past sessions. The exceedingly large number of patients for the extraction of teeth affords ample facilities for practical experience to every student.

In addition to the facilities afforded by this institution for a thorough course of instruction in the theory and practice of dentistry, the clinics in the University Hospital enable the Dental equally with the Medical Students to become familiar with the diseases and operations of Practical Surgery. Excisions of jaw, partial or entire; tumors, cancerous or benign, of various parts of the buccal cavity; plastic operations for restoration of cheek, lips, etc., may be mentioned as having been before the class during the year. The induction of anesthesia by means of different agents—ether, chloroform, bromide of ethyl, nitrous oxide gas, all being used in the clinics—cannot fail to be of use to the student of Oral Surgery. Junior as well as Senior students are afforded every opportunity for practical instruction in both operative and mechanical dentistry.

The Lecture Halls in the University Buildings are large and well lighted; and every facility will be afforded for practical and theoretical dental instruction. Demonstrations in Anatomy, Physiology, and Pathology (for which an abundance of material is furnished free of charge), also form an important part of the regular course. The Dissecting Room is large, well ventilated and lighted, and the Demonstrator of Practical Anatomy passes much of his time in assisting the students and directing their labors. **Dissecting Material is furnished in abundance, free of charge.**

The Qualifications for Admission and Graduation are those adopted by the National Association of Dental Faculties and the State Dental Examining Boards. The Diplomas of this School are recognized by all State Dental Examining Boards.

Qualifications for Graduation: The candidate must have attended three full courses of lectures of five months each in different years at the Regular or Winter Sessions in this institution. As equivalent to one of these, one course in any reputable dental college will be accepted. Graduates of medicine can enter the Junior Class. The matriculant must have a good English

education; a diploma from a reputable literary institution, or other evidence of literary qualifications will be received instead of a preliminary examination. All students, both juniors and seniors, have equal advantage in operative and mechanical dentistry in this institution throughout every session.

Graduation in Medicine: Graduates of the Dental Department of the University of Maryland are required to attend but one session at the University School of Medicine prior to presenting themselves as candidates for the degree of "Doctor of Medicine." (See Catalogue.)

The Regular or Winter Session will begin on the 1st day of October, and will terminate in March of each year.

The Summer Session, for practical instruction, will commence in March, and continue until the regular Session begins. Students in attendance on the Summer Session will have the advantages of all the daily Surgical and Medical Clinics of the University.

The fees for the Regular Session are $100, Demonstrators' Fees included; Matriculation Fee, $5; Diploma Fee, for candidates for graduation, $30; Dissecting Ticket, $10.

For Summer Session, no charge to those who attend the following Winter Session.

Beneficiary.—A Beneficiary student will be received from each State, on the recommendation of the State Dental Society, on the payment of half of the tuition fees. Board can be obtained at from $3.50 to $5 per week, according to quality.

The University Prize and a number of other Prizes will be specified in the annual Catalogue.

Students desiring information and the annual Catalogue will be careful to give full address and direct their letters to

F. J. S. GORGAS, M.D., D.D.S.,

Dean of the Dental Department of the University of Maryland,

845 N. Eutaw Street, Baltimore, Md.

The Haskell Post-Graduate School of Prosthetic Dentistry.

211 Wabash Avenue, Chicago.

L. P. HASKELL, President. A. M. MARKLE, Secretary.

This School, now in its fifth year, has a large and well-equipped laboratory, including electric motor for its lathes, and is open continuously. Students may enter at any time.

Instruction given in all that pertains to PROSTHETIC DENTISTRY, including Metal Plates; Selection and Arrangement of Teeth; Crown- and Bridge-Work; Continuous-Gum Work; Porcelain Inlays; and the Parmly Brown method of Porcelain Crowns and Bridges.

One month of technical instruction under the personal supervision of Prof. Haskell and assistants has been found sufficient time for these specialties.

Tuition Fifty Dollars.

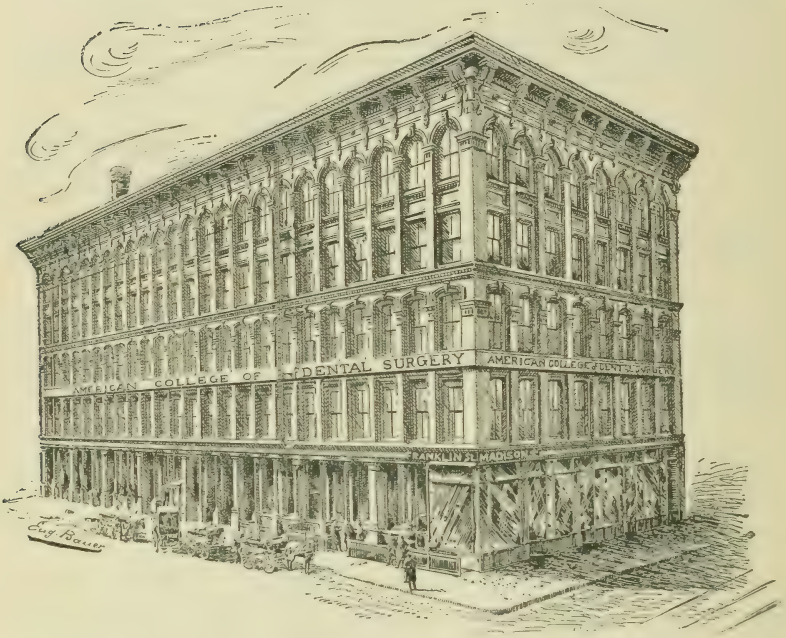
The laboratory is prepared to construct dentures of all kinds for the profession. Send for Price-List.

SAVE WEAR AND TEAR

OF YOUR PATIENT,
OF YOURSELF,
OF YOUR HAND-PIECE,
OF YOUR POCKET-BOOK,

BY USING THE "REVELATION" BUR.

American College
of
Dental Surgery.


AMERICAN COLLEGE OF DENTAL SURGERY
AMERICAN COLLEGE OF DENTAL SURGERY
FRANKLIN ST. MADISON
Eug. Bauer

After May 1, 1895,

Cor. Madison and Franklin Sts., Chicago, Ill.

Fall and Winter Sessions of Lectures and Clinics,
with Infirmary Practice,
OCTOBER 8 to APRIL 2.

Post-Graduate Course from April 1 to October 1.

For Catalogue and Circulars address

THEO. MENGES, D.D.S.,
Cor. Madison and Franklin Sts., Chicago, Ill.

BOSTON DENTAL COLLEGE.

563 TREMONT STREET.

1893-94.

FACULTY.

JOHN A. FOLLETT, A.M., M.D., Dean, Professor of Anatomy and Physiology.
EDWARD W. BRANIGAN, D.D.S., Professor of Clinical Dentistry.
GEORGE F. EAMES, M.D., D.D.S., Professor of Pathology and Therapeutics.
HERBERT L. SMITH, A.M., M.D., Professor of Principles and Practice of Surgery.
JAMES H. DALY, D.D.S., Professor of Dental Science and Operative Dentistry.
GEORGE A. BATES, D.D.S., Professor of Dental Histology and Microscopy.
JOHN B. COOLIDGE, M.D., D.D.S., Professor of Dental Art and Mechanism.
JOEL E. GOLDTHWAIT, M.D., Adjunct Professor of Principles and Practice of Surgery.
GREENLEAF R. TUCKER, Ph.G., S.B., Professor of Chemistry, Physics, and Metallurgy.

INSTRUCTORS.

WILLIAM A. WHITE, M.D., Instructor in Materia Medica.
WILLARD A. CURRIE, D.D.S., Instructor in Carving and Plastic Manipulation.
FREDERICK S. BELYEA, D D.S., Instructor in Bridge-Work.
E. V. McLEOD, D D.S., Instructor in Clinical Dentistry.
W. P. HOUSTON, D.D.S., Instructor in Clinical Dentistry.
W. G. KENDALL, D.D.S., Instructor in Clinical Dentistry.
E O. KINSMAN, D D.S., Instructor in Clinical Dentistry.
JOHN B GILLON, D.D.S., Instructor in Clinical Dentistry.
JAMES R. PIPER, D.D.S., Instructor in Clinical Dentistry.
L. E. BREWSTER, D.D.S., Instructor in Clinical Dentistry.
S. P. WILLARD, D D S., Instructor in Clinical Dentistry.
F. B. JOHNSTON, D.D.S., Instructor in Clinical Dentistry.
ALBERT H. KETCHEM, D.D.S., Instructor in Clinical Dentistry.
WILLIAM J. KELLY, D.D.S., Instructor in Clinical Dentistry.
J. WINSLOW BAILEY, D D.S., Instructor in Mechanical Dentistry.
ALPHEUS R. BROWN, D.D.S., Instructor in Mechanical Dentistry.

Professor in charge, EDWARD W. BRANIGAN, D.D.S.

Librarian, GEORGE A. BATES, D.D.S.

The year begins on the second Monday in September and ends on the third Wednesday in June.

It is the object of the Faculty to present a complete course of instruction in the theory and practice of Dentistry; for this purpose a well-appointed laboratory and infirmary are provided, at which there is an ample number of patients, insuring to all students abundant opportunities for operating at the chair and becoming by actual practice familiar with all the operations demanded of the dentist.

The Laboratory and Operating Room are open at 9 o'clock A.M. Demonstrators are present daily during working hours.

Students who began their professional studies elsewhere may be admitted to advanced standing. No student can advance with his class or be admitted to advanced standing until he has passed the required examination on the studies of the previous year.

Every candidate for the degree must have passed a satisfactory examination in every one of the departments of dental instruction at regular periods of the College course.

All candidates for admission are required before examination to produce certificates of good moral character, and students from other colleges are required to bring certificates from those colleges of honorable dismission. For admission they must present a degree in letters, science, or medicine from a recognized college or scientific school, or pass an examination in the following subjects:

1.—ENGLISH. Every candidate will be required to write legibly and correctly an English composition, and also to write English prose from dictation.

2.—PHYSICS. A competent knowledge of physics. (See Balfour Stewart's "Elements of Physics.")

Candidates from foreign countries must be able to speak the English language.

FEES AND EXPENSES.

For Matriculation	$5.00
For a year	100.00
For Demonstrator's Ticket (Anatomy)	5.00

There is no Diploma Fee and no Fee for Graduation.

For further information address

J. A. FOLLETT, M.D., Dean,

Hotel Nightingale, 637 Dudley St., Boston, Mass.

New York College of Dentistry,

205-7 East Twenty-third Street,

NEW YORK, U. S. A.

The attention of students is respectfully called to the following announcement by the N. Y. C. D.

1 *A yearly advance in the preliminary education requirements of students entering the college* (see page 3).

2 *A yearly lengthening of the lecture session—that of 1894–95 to six months, that of 1895–96 to seven months, and that of 1896–97 to eight months.*

3 *The requirement of evidence, prior to graduation, of three years' actual study and practice of dental surgery, inclusive of attendance on three lecture sessions, in separate years.*

4 *The inauguration, during the lecture session of 1894–95, of graded courses of practical work in subclasses, for the first year class, the second year class, and the third year class, respectively.*

c All students taking their first matriculation from October 21, 1894, to October 20, 1895, inclusive, thereby becoming candidates for degrees in the class graduating in 1898, must file a 12-academic-count or higher regents' certificate within one year after said matriculation.

d All students taking their first matriculation from October 21, 1895, to October 20, 1896, inclusive, thereby becoming candidates for degrees in the class graduating in 1899, must file a 24-academic-count or higher regents' certificate within one year after said matriculation.

e All students taking their first matriculation from October 21, 1896, to October 20, 1897, inclusive, thereby becoming candidates for degrees in the class graduating in 1900, must file a 48-academic-count or higher regents' certificate within one year after said matriculation.

f All students taking their first matriculation after October 21, 1897, must file a 48-academic-count or higher regents' certificate at the time of said matriculation.

For further particulars, or the College Catalogue, address

FRANK ABBOTT, M.D., Dean,
22 West Fortieth St., New York.

The Baltimore College of Dental Surgery,

Chartered by the Legislature of Maryland in 1839.

THE OLDEST DENTAL COLLEGE IN THE WORLD.

FACULTY.

M. WHILLDIN FOSTER, M.D., D.D.S., Professor of Therapeutics and Pathology.
WM. B. FINNEY, D.D.S., Professor of Dental Mechanism and Metallurgy.
B. HOLLY SMITH, M.D., D.D.S., Professor of Dental Surgery and Operative Dentistry.
THOMAS S. LATIMER, M D., Professor of Physiology.
WILLIAM SIMON, M D., PH D., Professor of Chemistry.
CHARLES F. BEVAN, M.D., Clinical Professor of Oral Surgery.
J. W. CHAMBERS, M.D., Professor of Anatomy.
GEORGE H. ROHE, M.D., Professor of Materia Medica.

LECTURERS.

R. BAYLY WINDER, Phar. G., D.D.S., Materia Medica.
WM. F. SMITH, A.B., M.D., Regional Anatomy.
J. N. FARRAR, M.D., D.D.S., Irregularities.
J. MEYER, D.D.S., Continuous-Gum.
DR. GEORGE EVANS, Crown- and Bridge-Work.
DR. K. C. GIBSON, Artificial Palates and Fractured Maxillaries.

CLINICAL INSTRUCTORS.

T. S. WATERS, D.D.S., Chief Clinical Instructor, Resident.

CORYDON PALMER, D.D.S.	Ohio.	C. M. GINGRICH, D.D.S., Resident	Md.
E. PARMLY BROWN, D.D.S.	N. Y.	J. HALL MOORE, M.D.	Va.
A. L. NORTHROP, D.D.S.	N. Y.	JOHN ALLEN, D.D.S.	N. Y.
CHAS. R. BUTLER, D.D.S.	Ohio.	R. B. DONALDSON, D.D.S.	D. C.
E. L. HUNTER, D.D.S.	N C.	H. A. PARR, D.D.S.	N. Y.
W. W. WALKER, D.D.S.	N. Y.	J. EMORY SCOTT, D D.S.	Md.
T. S. WATERS, D.D.S.	Md.	E. R. RUST, D.D.S.	D. C.
DAVID GENESE, D.D.S.	Md.	C. L. ALEXANDER, D.D.S.	N. C.
F. C. BARLOW, D.D.S.	N. J.	C. A. MEEKER, D.D.S.	N. J.

DEMONSTRATORS.

W. G. FOSTER, D.D.S., Demonstrator of Operative Dentistry.
GEORGE E. HARDY, M.D., D.D.S., Demonstrator of Mechanical Dentistry.

ASSISTANT DEMONSTRATORS.

W. W. DUNBRACCO, D.D.S. W. S. TWILLEY, D.D.S.
G. MARSHALL SMITH, D.D.S. J. S. SUTHERLAND, D.D.S.

W. F. SMITH, A.B., M.D., Demonstrator of Anatomy.
LOUIS F. ANKRIM, M.D., Assistant Demonstrator of Anatomy.
R. G. DAVIS, M.D., Assistant Demonstrator of Anatomy.
W. F. SMITH, A.B., M.D., Assistant Demonstrator of Anatomy.

☞The Baltimore College of Dental Surgery, the first, and for many years the only dental school, offers facilities for the study of dentistry proper, such as age and experience only can give. Its immense museum, complete apparatus, large and well-arranged building, and carefully studied curriculum, give to its students great advantages and opportunities, both theoretical and practical, while its age gives its diploma a dignity far outranking all other colleges—a diploma honorably represented in all civilized countries, and held by the most distinguished members of the dental profession.

The fact that dentistry must be practically taught is fully recognized, the College Infirmary, a most complete, large and handsome hall, being daily filled with clean and respectable patients, of a class nearly equal to those of the average dentist. The Infirmary is open all the year, students paying an entrance fee, which is deducted from those of the regular succeeding course.

The session begins October 1, closing in March A large corps of demonstrators, always present, put in actual practice the teachings of all lecturers in dentistry—leaving nothing undemonstrated. All methods are fully taught, all appliances and apparatus used; the making of instruments and the most elaborate gold and continuous-gum work, and all the cases arising in ordinary practice, with many which are rarely seen, carefully demonstrated.

Commencing October 1, 1895, women will be admitted to this College, subject to the same requirements as men.

The College has formed an alliance with the College of Physicians and Surgeons by which its students are privileged to attend all lectures and clinics. The patients of this medical school numbered last year over 40,000.

Graduates of the Baltimore College of Dental Surgery are required to attend but one session at the College of Physicians and Surgeons prior to presenting themselves as candidates for the degree of M D. (See Catalogue.) In accordance with the resolutions adopted by the National Association of Dental Faculties, which go into effect for the session of 1891 and 1892, the qualifications for entering the first year's course are a preliminary examination in the ordinary English branches.

TERMS OF GRADUATION.—Attendance on three winter courses of lectures in this College; as equivalent to one of these we accept one course in any reputable dental college. Graduates in Medicine can enter the Junior class.

BENEFICIARY STUDENTS.—Each State Dental Society is privileged to send one Beneficiary Student to this College at one-half the regular fees. This has been for some years an established feature of this College.

FEES.—Matriculation (paid once only), $5.00. Tuition fees, $100.00. Diploma fee, $30.00. Dissecting fee, $10.00.

Students corresponding with the Dean will please be careful to give full address, and direct their letters to

Prof. M. W. FOSTER, Dean,
No. 9 W. Franklin St., Baltimore, Md.

UNIVERSITY OF PENNSYLVANIA.

DEPARTMENT OF DENTISTRY,

Thirty-Sixth Street and Woodland Avenue, Philadelphia.

FACULTY.

Charles C. Harrison, A.M., Acting Provost, and *ex-officio* President.

Charles J. Essig, M.D., D.D.S., Professor of Mechanical Dentistry and Metallurgy.
Edwin T. Darby, M.D., D.D.S., Professor of Operative Dentistry and Dental Histology.
James Truman, D.D.S., Professor of Dental Pathology, Therapeutics, and Materia Medica.
Theodore G. Wormley, M.D., LL.D., Professor of Chemistry.
Edward T. Reichert, M.D., Professor of Physiology.
George A. Piersol, M.D., Professor of Anatomy.
John Marshall, M.D., Nat. Sc. D., Assistant Professor of Chemistry.

Robert Huey, D.D.S., Lecturer on Operative Dentistry.
Edward C. Kirk, D.D.S., Lecturer on Operative Dentistry.
John D. Thomas, D.D.S., Lecturer on Nitrous Oxide.
Norman Sturges Essig, D.D.S., Lecturer on Mechanical Dentistry.
Meyer L. Rhein, M.D., D.D.S., Lecturer on Dental Pathology.

CLINICAL INSTRUCTORS.

Dr. C. S. Beck.
Dr. W. G. A. Bonwill.
Dr. W. R. Millard.
Dr. D. N. McQuillen.
Dr. E. H. Neall.
Dr. H. C. Register.
Dr. Geo. W. Klump.
Dr. Edw. I. Keffer.
Dr. John R. Yorks.
Dr. R. R. Underwood.
Dr. I. F. Wardwell.
Dr. J. A. Woodward.
Dr. W. E. Christensen.

DEMONSTRATORS.

William Diehl, D.D.S., Demonstrator of Operative Dentistry.
Joseph W. White, D.D.S., Assistant Demonstrator of Operative Dentistry.
James E. Loder, D.D.S., Assistant Demonstrator of Operative Dentistry.
J. E. Dunwoody, D.D.S., Assistant Demonstrator of Operative Dentistry.
R. Hamill D. Swing, D.D.S., Assistant Demonstrator of Operative Dentistry.
Louis E. Rauch, D.D.S., Assistant Demonstrator of Operative Dentistry.
J. Thomas Lippincott, D.D.S., Assistant Demonstrator of Operative Dentistry.
Harry B. McFadden, D.D.S., Demonstrator of Mechanical Dentistry.
Ambler Tees, D.D.S., Assistant Demonstrator of Mechanical Dentistry, and Demonstrator of Continuous-Gum Work.
Frederick W. Amend, Jr., D.D.S., Assistant Demonstrator of Mechanical Dentistry.
Milton N. Keim, Jr., D.D.S., Assistant Demonstrator of Mechanical Dentistry.
Frederick A. Peeso, D.D.S., Demonstrator of Crown- and Bridge-work.
James G. Lane, D.D.S., Assistant Demonstrator of Crown- and Bridge-work.
Robert J. Seymour, D.D.S., Assistant Demonstrator of Mechanical Dentistry.
Robert Formad, M.D., Demonstrator of Normal Histology.
Edmund W. Holmes, M.D., Demonstrator of Anatomy.
Richard H. Harte, M.D., Demonstrator of Osteology.

The course of instruction is graded and extends over three years, with one session beginning first of October and ending early in June in each year.

Laboratory instruction of each student, not only in Practical Dentistry but also in Practical Chemistry and Histology, forms a prominent feature in this Department.

The appointments of the Lecture-Rooms, Operating-Room, and Laboratories, are as complete as any in America.

FEES.

Matriculation Fee (paid once only)	$5.00	Dissecting Fee (Second Year)	$10.00
Fee for One Course of Lectures	100.00	Graduation Fee (Third Year)	30.00

Board can be obtained at from five to eight dollars per week, according to location and accommodations. In locations near the college, students generally pay about five dollars per week

Students of the Dental Department have access without additional charge to all the other lectures and clinics in the Medical Deparment.

Surgical clinics at University Hospital twice a week; at Philadelphia Hospital, contiguous to the grounds of the University, Wednesday and Saturday.

University of Pennsylvania.—Dental Department.

The dental department possesses the means for thorough training, both theoretical and practical, not surpassed, it is believed, by any other institution. The operating-room is 140 feet in length by 40 feet in width, and lighted by windows on all sides. In front of each window is placed a Morrison Chair, a handsome nickel-plated movable bracket, and a neat walnut table. Battery wires are arranged to a number of the chairs for the use of electric pluggers.

The Mechanical Laboratory is supplied with all the modern appliances, and is under the care of an able and experienced mechanician. Special clinics will be given in continuous-gum and crown- and bridge-work.

The extensive Chemical Laboratories are under the charge of a demonstrator well qualified to meet all the requirements of his position.

The Dissecting-Room is large, well lighted, thoroughly ventilated, and is furnished with ample material for the successful prosecution of anatomical studies.

THE REGULAR OR WINTER SESSION.

The session will commence October 1, and ends at Commencement, early in June. The number of lectures per week, with a synopsis of the various branches taught, will be found in the General Catalogue.

In order to facilitate work in the practical departments, and to fully employ the student's time, the regular winter sessions are so arranged that the first-course student is required to devote the morning hours equally between *dental, histological, and chemical laboratory work.*

During the second and third years the student has the entire forenoon of each day for practical dental work. Ample opportunity is afforded for practice in operative and mechanical dentistry. In the latter branch, the students of the first year are divided into sections, thus devoting the time not otherwise engaged to practice in the operative and mechanical rooms.

It is believed that this plan of *grading the course*, and of affording the first-year student an opportunity of coming forward for examination in the branches of chemistry, histology, and materia medica, and the second-year student upon anatomy and physiology, will not only prove an economical arrangement of his time, but will really facilitate his labors in the acquirement of knowledge in the remaining branches.

PLAN OF EXAMINATIONS.

Attendance upon three regular courses of lectures will be required before the final examination for the degree of Doctor of Dental Surgery.

At the close of the first year, examinations are held in *chemistry, histology, and materia medica*, and the second year upon *osteology, anatomy* and *physiology.* If the student is not qualified, a second examination is afforded him at the beginning of the next winter session.

The final examination at the close of the third year is in *operative dentistry, mechanical dentistry, metallurgy, dental pathology and therapeutics.*

All applicants for advanced standing must pass the required examinations of this school, or furnish proof that they have passed *equivalent* examinations in some recognized dental or medical school. Graduates of a recognized medical college will be admitted to the second-year class without examination.

CONDITIONS OF ADMISSION.

Candidates for admission are required: *First*, to write an essay (not exceeding a page of foolscap) as a test of orthography and grammar. *Second*, to pass an examination in the English branches, viz: grammar, arithmetic, history, and geography.

A candidate who has received a collegiate degree or passed the matriculate examination of a recognized college, or who has a certificate from a normal, high, or grammar school, or a teacher's certificate properly attested, may enter without examination.

For information and announcements address

JAMES TRUMAN, D.D.S.,
Dean of the Dental Faculty, 3243 Chestnut Street,
PHILADELPHIA, PA.

Chicago College of Dental Surgery.

Dental Department of Lake Forest University.

The Annual Winter Course of Instruction will begin about October 1, 1895, and end about April 1, 1896.

Three full winter courses of lectures are required before graduation. Graduates of reputable pharmaceutical and undergraduates of medical colleges are admitted to the second-year course, and can become candidates for graduation after taking two winter courses of lectures.

GRADUATION IN MEDICINE.

Graduates of the Chicago College of Dental Surgery will be admitted to the medical colleges, and may become candidates for graduation in medicine after attending two full courses of lectures.

Graduates of the Chicago College of Dental Surgery are excused from the lectures on anatomy, physiology, and chemistry, from chemical and histological laboratory work, and dissecting.

Students desiring to graduate in medicine are required to notify the Dean in writing of their intention at the beginning of their second course.

TOPICAL STATEMENT OF WORK.

FIRST YEAR.

During the Freshman year the studies taken up are Theoretical and Practical Chemistry and Anatomy, Histology, Operative and Prosthetic Technics and Operative and Prosthetic Dentistry and Physiology, and during the latter part of the term some practical work in the Infirmary.

SECOND YEAR.

In the Junior year the studies of the Freshman year are reviewed, and the student performs practical work in the laboratories and operates in the Infirmary.

THIRD YEAR.

During the third year the student listens to lectures on Oral Surgery, Materia Medica and Therapeutics, Pathology, Operative Dentistry, Dental Anatomy and Pathology, and Orthodontia In addition to the lectures, each student is expected to operate in the Infirmary and perform practical work in the Laboratory.

Matriculation Fee, good to the close of the term . .	$5.00
General Ticket	100.00

There will be no separate fees for Chemical and Histological Laboratory work, Dissecting, and final examinations, as heretofore.

FEES FOR THE ANNUAL SPRING AND SUMMER COURSE.

Matriculation Fee (good till the following April) . . .	$5.00
Tickets for the Course	20.00

This amount will be deducted from the fees of the next following winter session.

Instruments and appliances for clinical department will cost from $25 to $40.

Board, including light and fuel, can be obtained at a convenient distance from the College, at from $4 to $6 a week.

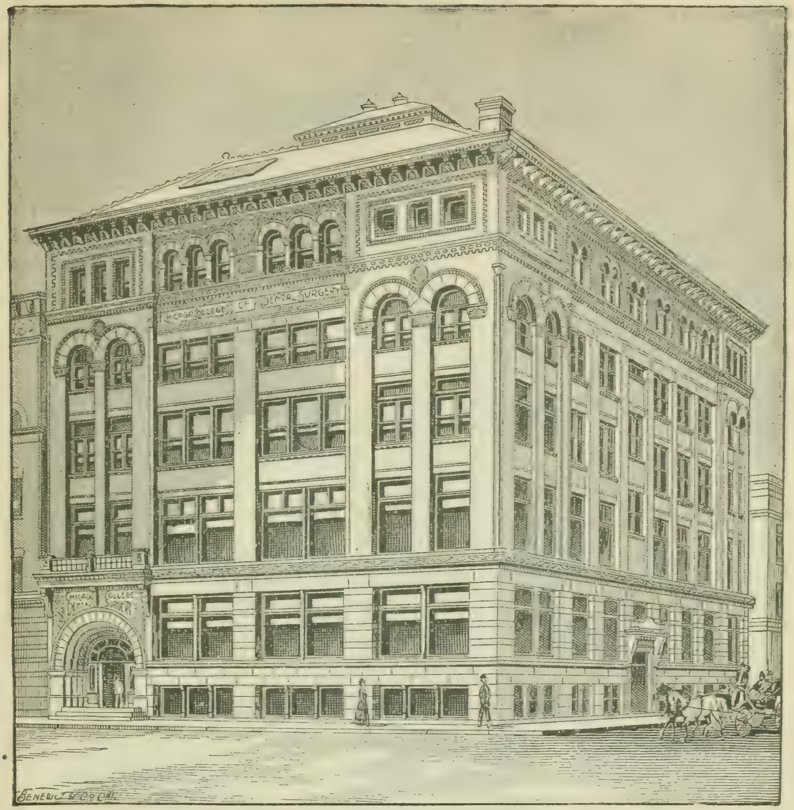
Graduates of the College are requested to notify the Dean of changes in their residences.

---

* A fee of $5 must be deposited to cover chemicals and breakage in the Chemical Laboratory.

Letters of inquiry should be addressed to

DR. TRUMAN W. BROPHY, Dean,
126 State Street, Chicago, Ill.


CHICAGO COLLEGE OF DENTAL SURGERY
CHICAGO DENTAL COLLEGE SURGERY
BENEDICT & CO. CHI.

THE COLLEGE BUILDING.

S. E. Cor. Wood and Harrison Sts.

The new college building occupies a prominent position among a group of fourteen others, comprising medical colleges, hospitals, and schools.

The lot on which the building stands has a frontage of eighty-five feet, and a depth of one hundred and twenty feet. It is a five-story and basement structure, the basement and first story being of rock-faced Bedford stone, and the superstructure of pressed brick and terra-cotta, with terra-cotta trimmings.

The building has two entrances, the main one through a large cut stone doorway surmounted by a stone arch beautifully ornamented with carved work. The interior is finished in hard wood, according to the latest idea of elegance, convenience, and comfort.

The entire six floors of the building are divided up into lecture rooms, class rooms, clinic rooms, etc., with the exception of the second floor, which is devoted to the Dental Infirmary. The chief lecture room has a seating capacity for four hundred and fifty students. There is also a dissecting room, thoroughly equipped with all the requisites for the study of human anatomy.

There are Histological, Chemical, Bacteriological Laboratories, also Laboratories for the study of Operative and Prosthetic Technics, and one for the construction of artificial dentures.

The building occupied by the Chicago College of Dental Surgery is, in all its appointments, one of the most perfect and complete of its kind.

Letters of inquiry should be addressed to

DR. TRUMAN W. BROPHY, Dean,
126 State Street, Chicago, Ill.

Pennsylvania College of Dental Surgery.

Eleventh Street, below Spruce, corner of Clinton.

FORTIETH ANNUAL SESSION, 1895-96.

FACULTY AND AUXILIARY INSTRUCTORS.

J. EWING MEARS, A.M., M.D., Professor of Anatomy and Surgery.

C. N. PEIRCE, D.D.S., Professor of Physiology, Dental Pathology, and Operative Dentistry.

WILBUR F. LITCH, M.D., D.D.S., Professor of Prosthetic Dentistry, Materia Medica, and Therapeutics.

HENRY LEFFMANN, M.D., D.D.S., Professor of Chemistry and Metallurgy.

ALBERT P. BRUBAKER, M.D., D.D.S., Professor of Physiology and General Pathology.

PERCIVAL E. LODER, M.D., D.D.S., Demonstrator of Anatomy.
GEO. W. WARREN, D.D.S., Chief of the Clinics and Demonstrator of Operative Dentistry
I. NORMAN BROOMELL, D.D.S., Demonstrator of Prosthetic Dentistry.
EDWARD F. WAYNE, D.D.S., Demonstrator of Chemistry
FREDERICK R. BRUNET, D.D.S., Demonstrator of Prosthetic Dentistry.
RUPERT BEALE, D.D.S., Demonstrator of Prosthetic Dentistry.
WILLIAM B. WARREN, D.D.S., Demonstrator of Operative Dentistry.
A. W. DEANE, D.D.S., Demonstrator of Prosthetic Dentistry.
R. WALTER STARR, D.D.S., Instructor in Crown- and Bridge-Work.
W. K. THORPE, D.D.S., Demonstrator of Operative Dentistry.
CHARLES S. HEARN, M.D., Instructor in Histology and Microscopy.
MARTHA ALLAIRE TERRY, D.D.S., Demonstrator of Operative Dentistry.
LUTHER G. TERRY, D.D.S., Demonstrator of Operative Dentistry.
E. ROLAND HEARN, D.D.S., Demonstrator of Operative Dentistry.
LOUIS BRITTON, D.D.S., Demonstrator of Operative Dentistry.
F. W. PROSEUS, D.D.S., Demonstrator of Operative Dentistry.
E. A. KRETSCHMAN, Instructor in Modeling.
F. A. CONEY, D.D.S., Instructor in Carving Block-Teeth and Full Porcelain Dentures.

CLINICAL INSTRUCTORS.

Dr. J. N. FARRAR,
Dr. W. G. A. BONWILL,
Dr. A. L. NORTHROP,
Dr. C. S. STOCKTON,
Dr. CHAS. F. BONSALL,
Dr. C. E. FRANCIS,
Dr. E. C. BAXTER,
Dr. A. H. BROCKWAY,
Dr. C. PALMER,
Dr. R. H. SHOEMAKER,
Dr. T. F. CHUPEIN,
Dr. W. R. MILLARD,
Dr. W. H. TRUEMAN,
Dr. R. HOLLENBACK,
Dr. J. G. TEMPLETON,
Dr. A. B. ABELL.

This College has accepted the requirements of the National Association of Dental Faculties with regard to admission and graduation of students. (See announcement for 1895-96, which can be procured from the Dean.)

THE SPRING AND FALL SESSIONS.

The Spring Course commences on the second Monday in April and continues until June 20. Fee, $50, which will be credited upon the fee for the regular session.

The Fall Course will commence September 3, and continue until the first of October, and will be free to those who matriculate for the regular session.

Attendance upon the Spring and Fall Courses will be deemed equivalent to the term of pupilage under a private preceptor.

THE REGULAR SESSION

Will commence on October 1, and continue until the 2d of April ensuing. Twenty lectures will be delivered each week on the various branches taught.

CLINICAL PRACTICE.

Lecture hours excepted, general clinical practice is available for the student continuously through the day. Competent instructors are always present.

GRADUATION IN MEDICINE.

By an arrangement with Jefferson Medical College, such students as may desire to do so can, if found qualified, obtain the two degrees, in Dentistry and Medicine, in five years. Students desiring to graduate in medicine are required to notify the Dean of their intention at the beginning of their second course.

FEES.

Matriculation (paid but once)	$5.00
For the Course (Demonstrators' Ticket included).	100.00
Dissecting Fee	10.00
Diploma Fee	30.00

Board can be obtained at from $4.00 to $6.00 per week.

The instruments and tools required can be procured for from $35.00 to $45.00. This sum does not include the price of dental engine.

For further information, address

C. N. PEIRCE, D.D.S., Dean, 1415 Walnut St., Philadelphia.

ESTABLISHED 1845.

Ohio College of Dental Surgery.

DEPARTMENT OF DENTISTRY—UNIVERSITY OF CINCINNATI.

SESSION 1895-96.

FACULTY.

J. S. CASSIDY, A.M., M.D., D.D.S., Professor of Chemistry and Materia Medica.
H. A. SMITH, A.M., D.D.S., DEAN OF THE FACULTY, Professor of Operative Dentistry and Dental Pathology.
C. M. WRIGHT, A.M., D.D.S., Professor of Physiology and General Pathology.
WM. KNIGHT, M.D., D.D.S., Professor of Anatomy and Oral Surgery.
GRANT MOLYNEAUX, D.D.S., Professor of Prosthetic Dentistry and Metallurgy.
H. T. SMITH, D.D.S., Assistant Professor of Operative Dentistry.

C. I. KEELY, D.D.S.,
Lecturer on Orthodontia.

L. E. CUSTER, D.D.S.,
Lecturer on Anæsthetics and Obtundents.

DEMONSTRATORS.

T. I. WAY, D.D.S., and H. A. WHITESIDE, D.D.S.,
Demonstrators of Operative Dentistry and Instructors in Operative Technics.

F. A. LUSH, D.D.S.,
Demonstrator of Prosthetic Dentistry and Instructor in Prosthetic Technics.

H. C. MATLACK, D.D.S.,
Demonstrator of Anatomy.

H. T. SMITH, D.D.S.,
Demonstrator of Analytical Chemistry.

The Fiftieth annual session begins Wednesday, October 9, 1895, and closes the second week in April, 1896.

FEES.

Freshman Year.

Matriculation	$5.00	Professors' Tickets	$75.00
		Dissecting Ticket	10.00
Junior Year.		Senior Year.	
Professors' Tickets	$75.00	Professors' Tickets	$75.00
Dissecting Ticket	10.00	Graduation Fee	25.00
Analytical Chemistry	10.00		

For further information and Announcements, address

H. A. SMITH, D.D.S., Dean,
or H. T. SMITH, D.D.S., Secretary,
116 Garfield Place, CINCINNATI, O.

COLUMBIAN UNIVERSITY

DENTAL DEPARTMENT,

WASHINGTON, D. C.

FACULTY.

SAMUEL H. GREENE, D.D., President of the Columbian University
J. HALL LEWIS, D.D.S., Professor of Dental Prosthetics.
HENRY C. THOMPSON, D.D.S., Professor of Operative Dentistry.
E. A. DE SCHWEINITZ, Ph.D., Professor of Chemistry.
WM. P. CARR, M.D., Professor of Physiology.
D. W. PRENTISS, A.M., M.D., Professor of Materia Medica.
D. K. SHUTE, A.B., M.D., Professor of Anatomy.
J. R. HAGAN, D.D.S., Demonstrator in charge of Infirmary.

CLINICAL INSTRUCTORS,

ALL OF WHOM LECTURE ON SPECIAL SUBJECTS DURING THE WINTER COURSE.

R. B. DONALDSON, D.D.S.
J. CURTIS SMITHE, D.D.S.
W. S. HARBAN, D.D.S.
H. B. NOBLE, Sr., D.D.S.
L. C. F. HUGO, D.D.S.
WM. DONNALLY, D.D.S.

The Regular or Winter Session begins on the first Monday in October, and ends April 30. The Infirmary opens October 1, and closes July 1.

The course of instruction in this College extends over *three years*, and is arranged as follows:

The subjects taught in the first year are Anatomy, Physiology, Chemistry, and Materia Medica. In the second year to the above studies are added Operative and Prosthetic Dentistry. The third-year studies consist of Operative and Prosthetic Dentistry.

An examination is held at the end of each year on all subjects taught during that year.

It is thus seen that during the third year the student devotes his entire time to Operative and Prosthetic Dentistry, and being thoroughly grounded by his former studies in the collateral branches, is enabled more fully to understand and appreciate the Lectures and Clinics on these subjects.

In the Infirmary the student has the advantage of twenty-seven (27) months' instruction in Practical Dentistry, and by the manipulative skill thus acquired is fully able, after graduation, to successfully cope with any oral lesion which the general practitioner is called upon to treat.

Matriculants must show, either by examination or by the exhibit of a certificate from some literary institution, that they have received a good English education.

Candidates for graduation must have attended *three full* Courses of Lectures and Clinical Instruction in this College during the winter terms, and in separate years.

One Course of Lectures in any other reputable Dental College, or one or more courses in a recognized Medical College, is taken as an equivalent for one term in this Institution.

Two full Winter Courses in a recognized Dental College is taken as an equivalent for two terms in this College.

Graduates of other recognized Dental Colleges will be admitted on paying the Matriculation Fee and Fifty Dollars.

FEES.

Annual Tuition Fee $100.00

There are no other charges or extras of any kind whatever.

For further information, address

J. HALL LEWIS, D.D.S., Dean,

1309 F Street, N. W., Washington, D. C.